

Aleksandr Kud

Postgraduate of the Department of Economic Policy and Management at the Kharkiv Regional Institute of Public Administration of the National Academy of Public Administration under the President of Ukraine, CEO of SIMCORD LLC, board member of the NGO “Research Center of Economic and Legal Solutions in the Area of Application of Distributed Ledger Technologies”

ORCID 0000-0001-5753-7421

alexander.kud@simcord.com

DECENTRALIZED INFORMATION PLATFORMS AS A TOOL OF PUBLIC GOVERNANCE MODERNIZATION

Abstract. This paper offers the author’s presentation of such a relatively new technological and organizational phenomenon as a “decentralized information platform” (DIP) being a new and useful tool for public governance modernization. To that end, the author gives this new concept the first definition as well as theoretical justification for the consequences of taking into account the key features of decentralized information platform for the public governance needs.

The logic of presenting the information covers five interrelated tasks: 1) to create a logical scheme for semantic representation of the “decentralized information platform” concept; 2) to prove that the “centralized information platform” phenomenon is derived from a wider phenomenon of “information platform”; 3) to define six key features of theoretical construction of decentralized information platforms and three practical managerial features of DIP to be taken into account when public governance is being modernized; 4) to compare the key features of centralized and decentralized information platforms, and 5) to provide a theoretical description of framework for representing the “decentralized information platform” as a public governance modernization tool as well as a new, modern important factor influencing the public relations.

Conclusions have been made that: 1) decentralized information platforms have an extensive potential and can be considered as a very promising tool for modernization of public governance as a system. In particular, this refers to forming proactive impact on a citizen, on the one that has the ability and capacity to take active part in day-to-day activities of the government due to the development of a new democratic model using tools provided by electronic democracy; 2) it is suggested that the

“decentralized information platform” means a type of digital data accounting system based on a distributed ledger technology, which consists of a service infrastructure and a community of independent users having equal rights or pre-identified rights granted according to the levels of decentralized governance model to make such a system stable; 3) the important task of civil society and renewed public governance system will soon lie in studying new political and social dimensions in order to integrate applications of the latest breakthrough technologies, such as blockchain, with civil rights, equality, social cohesion, and public sector security. Such integration is very important, and it cannot be left to the discretion of (anti-)political engineering of IT experts, financial investors and political populists as it truly requires mature and interdisciplinary efforts from all areas of human knowledge with special attention paid to political theory and social sciences to assess risks, advantages and results of new technologies in the best way possible.

Keywords: digital platform, decentralized information platform, modernization, public governance, technology-based humanism.

1. INTRODUCTION

Problem statement. People and companies all over the world increasingly demand online individual and affordable services from the government. At the same time, convenience and simplicity, having more settings with less difficulties, and safe online services are becoming more important. Meanwhile, authorities are having low budgets, and this problem has intensified with the COVID-19 pandemic, when hundreds of thousands of entrepreneurs in almost all countries faced working restrictions. All this compromises the stability and quality of earlier traditional public services, budget investments, and social expenditures. In order to solve the above problems, the central authorities and big cities are rethinking their public service models and looking for new types of partnership with the private sector, which has become a new and growing trend covering various jurisdictions and a wide range of services. However, being a traditionally closed institution, an authority faces the problem of making its data publically available: it still wants to a large extent or even completely supervise the processes of making data public and controlling it, which is

becoming less and less possible.

Information platforms may solve this problem. They are the major and the most technologically promising method of fulfilling the expectations of both the government and people regarding these matters. Platforms are considered as a kind of “coordination centers” and a cutting-edge technological market infrastructure used by various participants for providing services or creating virtual communities. However, the general problem is that while centralized information platforms are being very popular, blockchain-based decentralized digital platforms get no attention. This causes another public governance problem: how should the state treat such platforms, private electronic registers, and relevant service ecosystems, which together make the “core” of a decentralized platform and develop rapidly?

Analysis of the latest research and publications. Issues related to using information platforms in the public sector and governance have emerged not so long ago, namely in the early 2010s, but they recently have attracted the attention of dozens of scientists from developed countries and China. This is possible because it is in these countries that private centralized digital platforms such as Amazon, Facebook, AliExpress, and many others have emerged, which have now begun to influence government in some way, offering ordinary people a new convenient way to meet their needs in their virtual environments. In the late 2010s, the rapid development of blockchain technology set a new trend related to the development of decentralized information platforms based on this technology. However, despite the attention to political and technological [1; 2; 3; 4; 5] aspects of this phenomenon, the world scientific literature currently lacks research on the prospects of using decentralized information platforms as tools of public governance with predictable and controlled influence for the common good, rather than the benefit of private platform owners, as is the case for centralized platforms. There are many theorized fears, but the trend is becoming a fact before our eyes — information platforms will gradually change the state and the traditional system of its governance.

2. AIM AND TASKS

The aim of this paper is to propose a new concept of “decentralized information platform” (DIP) and theoretically justify the consequences of taking into account the key features of decentralized information platform for the public governance needs.

The paper has set the following *tasks* in accordance with the above aim:

- firstly, to create a logical scheme of semantic representation of the “decentralized information system” concept;
- secondly, to prove that the “centralized information platform” (CIP) phenomenon is derived from a wider phenomenon of “information platform”;
- thirdly, to define six key features of theoretical construction of decentralized information platforms and three practical managerial features of DIP to be taken into account when public governance is being modernized;
- fourthly, to compare the key features of centralized and decentralized information platforms;
- fifthly, to provide a theoretical description of framework for representing the “decentralized information platform” as a public governance modernization tool as well as a new, modern important factor influencing the public relations.

3. THEORETICAL BACKGROUNDS

It is known that decentralization is the process of redistributing functions, powers or resources from the central level of governance to its lower levels. Despite the clear principle of decentralization, the phenomenon of decentralization is applied somewhat differently by scientists in relation to group dynamics and management of private enterprises or in the public sphere. Regarding digital solutions and information technologies, decentralization characterizes the relations between the participants of a single information system, where power and control in governance structures and decisions are distributed between developers and community members and are not

concentrated in any of the participants [1; 2; 3]. It is clear that decentralization of governance through open blockchain-based distributed ledger means has both advantages and disadvantages caused by the peculiarities of governance being open and public and covering a very large number of unrelated objects (citizens, property, public institutions, etc.) as well as by the features of technology (in particular, blockchain as a kind of popular distributed ledger technology) used for such decentralization. Currently, as the blockchain technology is being used increasingly often in the management of complex systems, such management should be considered as “organizational theory — with significant technical and managerial advantages for markets, private services, communities, but not as an independent political theory” [4, P. 27].

Wide international experience in reforming public administration indicates that modern society is already prepared to positively take digital technologies as a new, encouraging factor for change. In addition, “it must be acknowledged that digital technologies, new governance methods, mutual integration of economies and other changes significantly influenced the ability of markets to meet the needs of people and businesses” [6].

As early as in 1990–2000s, the “pre-digital” Western concepts of new public governance and good governance envisioned new roles for people and institutions with a shift towards the “service state”. Thus, service users gradually acquired new roles, becoming evaluators, developers, and co-producers of services, while their informal communities made an organized and persistent request for change in the public sector. At the same time, state institutions now have the role of just one of many players, and not the only or main rulemaker as before. In this context, digital technologies are rather seen as tools for supporting and implementing electronic services with the use of state (public) registers and special secure applications. However, deeper implementation of technology in governance processes requires much larger and profounder changes.

The rapid spread of Internet has undermined traditional relations between the authorities and the public. Nowadays, such relations are formed in a highly organized environment, where large-scale budget programs are created and implemented. Formal and informal rules governing the behavior of the state and citizens are changing towards “open government”. They result in reduced state control and greater self-regulation, as actions are carried out outside traditional administrative chains. Innovations become more and more popular, if they are offered in cooperation with public authorities and private, market actors. This approach is the basis of the concept of “open government”. In its context, through open public registers, citizens have access to a large amount of different information, and they also gain more rights when policies are being developed and public services are being improved. While providing better accountability, “open government” is a stream that seeks to make government transparent by providing an understanding of its functioning as well as government data [5]. Despite losing some of their control capabilities, authorities can benefit from instant feedback to improve their performance [7].

4. RESEARCH METHODS

A set of scientific methods of cognition will be applied in this paper according to the following logic: from the monographic method, analysis of existing scientific opinions and, accordingly, deduction based on them — to the synthesis of properties and induction of consequences of using decentralized information platforms to modernize public governance.

5. RESEARCH RESULTS

Currently, the most common concepts of “open government” do not answer such questions as “Which public services are successful and which are not, and for what reasons?”, “What is the quality of data?”, “What is this data used for?”, “What

other parties are interested in the data?”, “What consequences may this data bring on the policy?”, etc. Authorities often fall short of the answers to these critical questions. The search for relevant answers and successful introduction of information platforms in business have created the basis for perceiving the idea of information platforms as a new technologically useful phenomenon for the public sector needs. Since the late 2010s, the authorities of different countries have been gradually using the information platforms that can be offered and used by independent private application developers, commercial users, and ordinary people to provide even greater benefits to all parties involved. The platforms’ feature of instantly providing the authorities with information about the cooperation participants and interaction between them is especially valuable. Thus, the mechanism being the core of information platforms allows you to “do more with less cost” by involving others despite the partial loss of control and significant increase in the number of participants involved [5]. By implementing and using information platforms for business and people, an authority can instantly monitor what is happening, and then arrange necessary interactions in the best way. Thus, information platforms can be considered as a kind of *regulatory environment*, as an *impersonal governance entity* based on software code that allows private developers, users, and others to interact with each other, share data, services and applications, and for governments that provide certain administrative services through information platforms, they ensure easier tracking of processes and promote the development of simple and innovative solutions and services (Fig. 1). However, platforms are not self-sufficient “isolated islands”: integrating them with other information platforms and information systems is not easy, as everything is connected to everything on the Internet, and information is easily checked.

In order to clearly outline the potential and capabilities of decentralized information platforms for the purposes of modernizing public governance, it is first necessary to define the essence of “information platform”, “digital platform” being close to it, “service ecosystem”, “centralized information platform”, and

“decentralized information platform” (Fig. 2), as well as their purpose as tools for governing and influencing numerous objects and processes not only in the state, but in modern society as well, which are constantly becoming more complicated. To answer these questions, we should turn to the semantic analysis of concepts and conclusions from the latest technical literature.

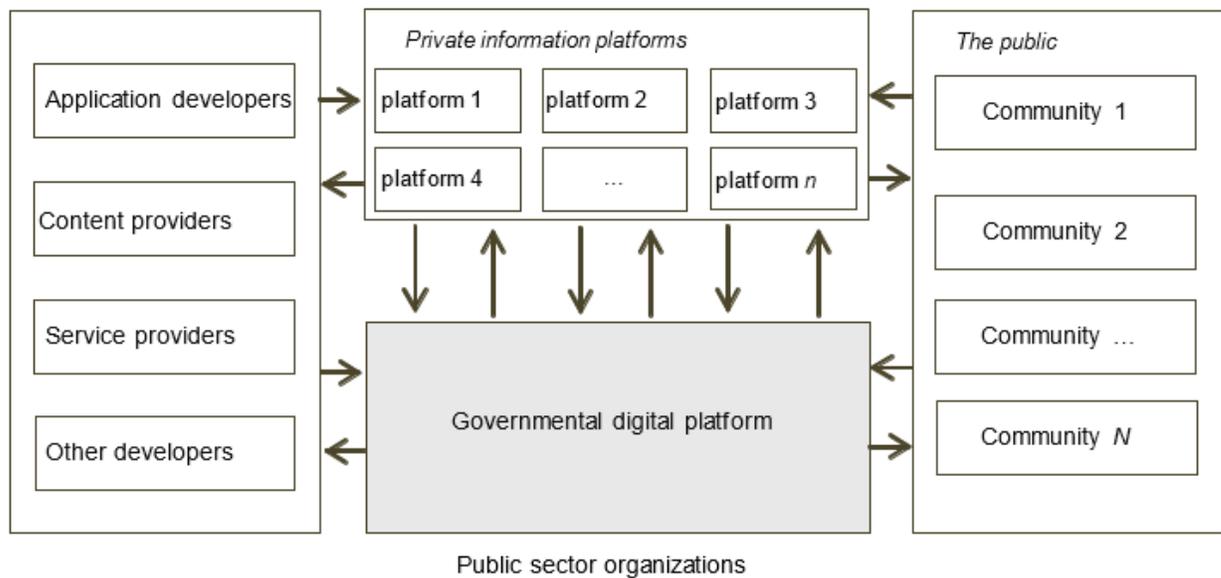


Figure 1. The general logic of using information platforms within the caring governance concept [5]

Information platforms and centralized information platforms. Today, information platforms, especially centralized platforms developed in the early 2000s, are given a lot of attention in the private sector. Therefore, different authors define them differently, namely:

- as products, services or technologies connecting customers of different types [8, P. 75];
- as multi-sided markets and related technological solutions [9], and as developed organizations designed and operating around two- or multi-sided markets

[10; 11];

– as “technological and managerial solutions combined into a single technological complex, which becomes a mediator between citizens and the state” [12, P. 2] (from practical point of view). In this case, the state has long been operating through a system of its bodies, providing public services, which forms a simple relationship of intermediaries between citizens and databases.

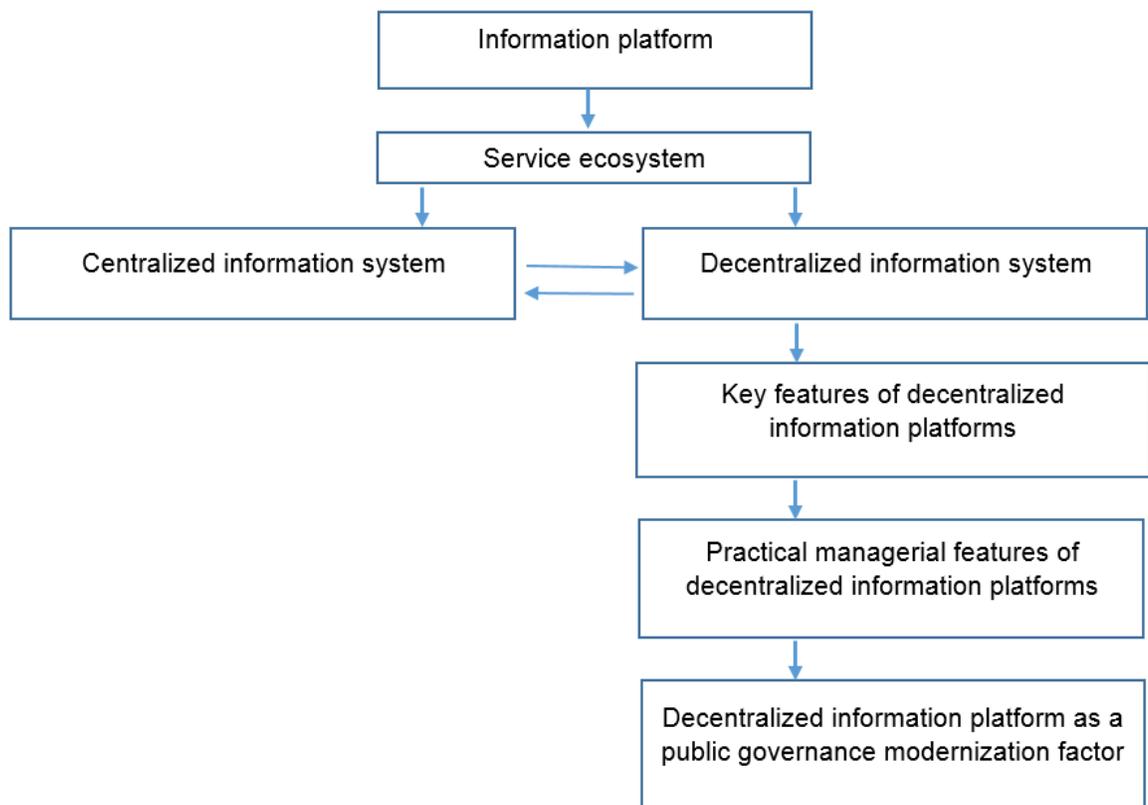


Figure 2. Logic chart of semantic presentation of the “decentralized information system” concept

*Source: author’s development.

The idea of an information platform is to create a community and support it using digital services, and, as a managerial consequence, to benefit from reduced

transaction costs by eliminating some intermediaries [13, P. 278], increase coverage, and ensure sufficient mutual control exercised by users and owners of such a platform.

For example, with regard to the public sector, the typical clients of public information platforms are at least the following three groups:

a) individuals as users of services and content who voluntarily participate in democratic processes;

b) application developers;

c) public authorities, which either act as customers of electronic services or provide content based on data from their closed registers as intermediaries, but always seek feedback from all other service users and are eager to easily interact with them. However, the risk to the sustainable effectiveness of public governance is that the fragmentation of public and private resources weakens relations with citizens and scatters public resources, as more public institutions develop their own centralized information platforms and maintain their own closed electronic data registers. For example, according to the inventory check conducted by the State Agency for e-Government in 2020 and only in terms of access to data of closed or partially open state registers of Ukraine, there are over 350 electronic state registers existing, which belong to more than 80 public authorities. Over UAH 500 million is spent from the State Budget of Ukraine on the annual support of 25 priority state registers. Electronic registers are usually hosted on holders' own facilities, and more than 45% of the funds for their support are used to purchase spare parts for servers [14].

It should be emphasized that, firstly, the need to maintain control over the processes and those involved as service users and, secondly, taking into account the time when first platforms appeared, all the first (by the time of their appearance) information platforms were centralized. Until now, most world-famous private information platforms and so far all known state or departmental information platforms (for example, Diia, e-Estonia, Georgian GovHub, etc.) have been

centralized, i.e. such that are based on the principle of hierarchy and have more than two levels: end user → platform → service provider.

The key features of a *centralized information platform* are as follows: governance is based on acquired rights in the hierarchy; the centralized coordination method creates additional added value for owners or higher ranks in the hierarchy, which indicates the priority of “economics over politics” [15]; governance based on market rules and rights in the hierarchy; emphasis on hierarchical web networks with or without clear territory relation and on online interest groups; asymmetry of information for participants, owners, “nodes” managers; the main evident benefit is easy, quick, and convenient use of services through the platform as an intermediary; it exists in a dilemma of choice between secure transaction protection and personal data protection, confidentiality and censorship [16]; relatively low complexity of building and maintaining the viability of the platform [17].

According to A. Cordella and A. Paletti [18], platform organizations increase the efficiency of public organizations as: 1) they ensure the participation of external actors in the joint production of public services, helping organizations to benefit more with less investment; 2) platforms are built on modular structures based on stable core services to allow the development of third-party applications to support the evolution of service delivery and reduce the complexity of coordinating the actions of participants involved in the production and delivery of these services; 3) platforms are easily accessible and simplify changing and creating services. Thus, modern information platforms can be considered as a new type of market infrastructure, which in fact is dynamic “socio-technological systems that emerge and evolve through the interplay of technology, users, and policy-makers” [19].

In modern network interaction of different objects and subjects, different private information platforms (for example, LinkedIn, Facebook, Twitter, etc.) are interconnected during the provision of services to the end user. This means that a conditional public (for example, state one, such as the Ukrainian Diia) information

platform may have a close functional connection with other (for example, private) digital services and information platforms that emerged long before the state one and already have a large user base. Using such information platforms, APIs and open source software (for example, Android or Ethereum based on the blockchain technology [20]), as well as services available, others are now able to develop and offer a variety of programs and services with advanced functionality as well as to provide them to the public. In this case, public authorities, in particular governments and large cities face a problem: how not to lose control of changes in information flows and, consequently, to adjust one's governance model using new information technologies?

Service ecosystems. “Service ecosystems” is a kind of common “denominator” of developed centralized and decentralized information platforms and the implementation of “e-environment” of useful services; for the purposes of this study, it is used as a necessary factor to maintain the continued interest of independent users in digital technologies and a clearly available tool of the “service state”. In general, the “ecosystem” understood as modern services rather than as a biocenosis, has become a popular term and an important trend in corporate development. An ecosystem is a set of own or partner services grouped around a single company and built to cover as many of a customer's day-to-day needs as possible [21]. While all existing commercial ecosystems are formed around some key services (for example, financial, exploratory), ecosystem of the digital state is a more complicated phenomenon. It cannot be reduced to the development of a specific flowchart as it is the development of a policy based on solid principles.

For instance, cooperation with the Russian government requires adhering to such principles as open information platform, standardization, data integrity, and formalization of experience [22]. Thus, Russian government officials consider only open information platforms for partnership and do not want to develop their own or integrate third-party closed platforms, and this approach gives a lot of chances to

small and medium-sized local IT companies. Today in Ukraine, large banks, mobile operators, marketplaces, and some energy companies are creating their own ecosystems based on digital platforms. At the same time, such questions as “What is the best way to organize the state service ecosystem so that public services are built as a single layer of frontal services?”, “How to make it a key point of contact with citizens, where the state, in particular, communicates and controls its order?” and “How to save billions of budget funds annually due to the use of private resources and tested products?” still remain open to many governments. There are two scenarios for how to do this: 1) either the state should “dissolve” with its services in already existing private ecosystems and “discreetly” allow there using services in any place where a person is; 2) or the state becomes a full-fledged, independent player, which invites to its infrastructure the services of commercial systems that have already succeeded [22]. According to the relevant government officials, some modern governments (for example, those of Ukraine, Russia, and the Czech Republic), are ready to provide electronic public services in the digital environment of certain ecosystems, provided that they are rigidly packaged on the basis of functional complementarity and having similar subjects. Thus, these arguments indicate the need to involve information platforms, which can be at least a tool and, probably, a separate organizational and technological mechanism of public governance.

To support the service ecosystem as such, an important requirement is set for a private partner being a platform owner, which is to maintain the structural integrity of data, the single design of service architecture both in terms of development environment and data models, and protocol consistency, which should serve the end goal, namely to provide people with the most comprehensive digital technology servicing.

In this context, it is important to note that one of the key and most promising focuses on the development of “service ecosystems” in the country is and will be the issue of accessing and developing a common database, namely electronic registers.

For many countries around the world that have embarked on the path of digital transformation, the issues of creating their own electronic national data management system and interdepartmental electronic interaction system have become relevant, and this will be possible only through integrating public registers and, ideally, partially integrating dozens of electronic private registers of corporations with electronic public registers. The role of private providers, especially those who already have their own electronic registers and which, depending on the specifics of national legislation, can be legally integrated with other public registers, is especially important and mutually beneficial for solving these issues. This will drastically reduce the budgets for maintaining registers and speed up the process of providing services.

Decentralized information platforms. As known, the level of governance decentralization is one of the key parameters of governance as a controlled system influencer [23; 24; 25]. It indicates how and what governance and control rights are distributed between owners and participants of a digital or an information platform [1; 3; 26]. Information platform owners willingly relying on technology and from the very beginning sharing some of their control functions with other information platform participants would rather aim for the common good than private interests. In some cases, there may be no information platforms owners, and then information platform participants will have shared access to the total control. However, the current research on platform governance [27; 28; 29] are often focused on centralized governance while paying much less attention to decentralized information platforms and decentralized governance based on information technology. Given the increasing complexity of and division of responsibilities in digital platform governance [30], it is important to focus on decentralized governance and its implications for the future of both the platform economy and public governance.

It is commonly recognized that blockchain technology, which is the basis of DIP, can significantly improve the structure, governance, and decision-making in specific realities, making them less dependent on top-down coordination. It should be

noted that apart from decentralization being one of its key characteristics, blockchain's distinctive feature is its accounting object and technological solution for its implementation. This refers to high-level encrypting, open protocol, distributed information storage, transferring digital data among accounting addresses without intermediaries, which ensures reliable and transparent transactions [31].

However, blockchain-based decentralization has one major limitation for the public sector: algorithms and binary codes are not intended for policy making [15], since politics is an art that comes from the ethical realm of people and belongs exclusively to them as beings “endowed with reason and conscience” (Article 1 of the Universal Declaration of Human Rights [32]).

It should be noted that decentralization through distributed blockchains mainly means privatization of public functions with transformation of public services and civil rights into a new profitable private business. Since “the so-called freedoms often claimed by vigorous postmodernist political thinkers have in fact become powerful sources of vulnerability” [33, P. 11], one should consider the main reason for centralized coordination of state institutions, which is to protect the common good and collective rights from transitory individual interests and any reckless benefit in the long run. And from this point of view, “it cannot be ignored that permissioned, token-less blockchains hold a considerable advantage over fully distributed blockchains” [15].

It is still difficult to explore new governance structures either because most digital platforms tend to have a centralized governance structure [34], or because different platforms for different areas of life may be too different to compare. However, the modern development of blockchain technology offers a unique opportunity to explore relatively new — decentralized — governance structures: the blockchain technology becomes the basis for a large number of new international information platforms “for peer-to-peer operations with no intermediaries using decentralized information storage to display all data on operations” [35, P. 3].

Unlike centralized platforms, DIPs have the following key features: governance is based on consensual forms of self-government and direct citizen participation in decision-making; no coercion at the base level, more equality and freedom for the participant; consensus based on program code; distributed architecture of permissioned blockchains; political use of secure cryptographic encryption; a new way to provide a “scale effect”; emphasis on peer-to-peer web networks without clear territory relation and on online interest groups; governance based on distributed trust and market rules; a de facto organized minority has greater rights and may gain additional benefits from asymmetry of information and replication of registers; tendency to natural centralization of computing power in the network of participants, which is a consequence of scaling and increasing the coverage of participants.

Currently, the few classifications of DIPs based on blockchain technology offer the following division:

1) infrastructure layer platforms and software application layer platforms [36; 37; 38];

2) platforms of the layer of innovation markets, platforms of the layer of transaction markets and platforms of the layer of information markets [39]. As for the relationship between them, as noted in [34], there is (a) the relationship between the infrastructure layer platform and innovation markets and (b) the relationship between the application-specific platform and the transaction and information markets. However, modern blockchain-based innovation markets are unique in that they can support both related and basic large-scale technological innovations due to their ability to allow external developers to develop a certain basic technology using open source code.

Given this classification and guided by the ideal of “common welfare” and common good for all platform participants (theoretically speaking, almost all citizens of the state can be such participants), we can identify six key features of the theoretical construction of decentralized information platforms to take into account

when modernizing public governance:

1. *Digital platforms at different levels of their application may face different design constraints that may affect the governance structure [36; 37; 38].* For example, the Internet is a fundamental infrastructure layer decentralized platform [40; 41], and conversely, platforms based on the Internet infrastructure, such as Uber and Twitter, are much more centralized. Similarly, blockchain-based information platforms forming a decentralized infrastructure are much more decentralized in their structure, while platforms with more specific applications are more centralized [2]. For example, while Ethereum is a blockchain-based infrastructure with a relatively decentralized governance structure [42], the Basic Attention Token is on contrary a platform for specific Ethereum-based software applications with a relatively centralized governance structure.

2. *Infrastructure layer digital platforms are much more decentralized than application level platforms* (as shown in [34; 43]), because they provide a common technological basis for different information platforms with many software applications. This means that they have clear characteristics of public goods and meet the requirements of openness and neutrality for all users for greater social welfare and the so-called “network effect” [43]. They also tend to be more productive [37; 44] and are often too important for easy use by anyone, and this forces them to continue to be technologically decentralized and democratic [45]. If they were centralized, private owners of such information platforms would have too much influence on all users, from individuals to authorities, and this could lead to unpredictable systemic problems [46]. As users of such platforms want to at least somehow participate in the information platform governance to make sure the processes within the platform are fair (for example, various access rights, communication, identification, rating, etc.), the infrastructure layer information platforms will continue to be decentralized.

3. *Application layer digital platforms (software application layer) tend to be more centralized* as they are designed to serve more specific concerned parties

with specific objectives. They are less likely to cause systemic governance problems (for example, conflicts of interest), which will allow the owners of such platforms to retain significant operational governance and control rights quite confidently [47]. In addition, the owners of such platforms usually have special knowledge and capabilities for the most effective operational governance and information security of such systems. As a result, application digital platforms are less open and less decentralized. Thus, it has been proven [34] that infrastructure layer information platforms tend to be more decentralized than application layer platforms.

4. Unlike centralized information platforms [30, PP. 7–8], *decentralized information platforms almost do not tend to monopoly in the markets where they operate*. This is due to the well-known features and experience of the world’s private and public (for example, Ukrainian Diia) centralized information platforms, which are so far more studied compared to DIPs, and the very principle of logical construction of DIP [9]. Such features are not new, but (a) they are combined for the first time and (b) their existence pushes markets to monopolization by one company. Such features of centralized information platforms include: 1) strong network effects (i. e. the more people use the product, the more attractive this product becomes for other users); 2) significant economies of the scale (each subsequent unit of goods becomes cheaper for the manufacturer with increasing production); 3) marginal costs that are close to zero (the cost of servicing each new customer is close to zero); 4) the rapidly increasing return on the use of big data (the more data managed by the company that owns the product through the information platform, the better the product offered for consideration); 5) low distribution costs, which allows to achieve almost global coverage of the target audience.

5. *Extensive opportunities for dynamic interaction between participants*. From a governance point of view, all modern blockchain-based information platforms (both centralized and decentralized) offer some dynamic interaction between participants (and sometimes even an “ecosystem” as the **Bitbon** System [48],

MakerDAO, Compound, Uniswap [49], and others do) using complex digital services, and this allows for analytical comparisons between digital and information platforms [34]. Moreover, different information platforms have almost unique structures, and therefore provide a significant variance for studying the effectiveness of such relatively new governance structures [50; 51; 52; 53]. For example, Ripple is a centralized digital platform for cross-border payments based on blockchain, in which Ripple Labs Inc. being a development company controls and supports the project, and owing to centralized management, this company can benefit from management, but can also marginalize and remove others.

6. *A decentralized information platform can use the classic concept of a non-profit organization, but in a decentralized form.* Instead of a hierarchical structure governed by a group of people with control of property (resources) through the legal system, a technologically decentralized organization includes a group of people who interact with each other according to the program protocol specified in the program code and used in the blockchain. Such an organizational structure usually contains (a) donors and members (recipients of charity may or may not be considered members; an alternative view considers a positive increase in the welfare of recipients as a “product” of a non-profit organization) and (b) open membership clients [54], each of which can freely interact with the technological platform in an officially permitted manner at any time. Providers in this model are equivalent to employees in the usual model of organizational relationships.

In view of these theoretical features, it is necessary to point out three practical governance features of DIP, which have significant potential to be taken into account in the mechanism of modernization of the DIP-based public governance system:

1) *strategic leadership on digital platforms.* Numerous information platforms based on blockchain technology, especially infrastructure layer ones with independent program code based on blockchain, can and should be decentralized. Such information platforms can be open to anyone, and this will significantly bring

technological and governance innovations closer to millions of users [55]. Therefore, these information platforms usually use fully technologically decentralized management structures. When decentralized information platforms are combined with decentralized governance, they really allow open and unauthorized participation and free distribution of innovations allowing this DIP to further develop organically [40; 2]. However, there is a risk that without effective governance these information platforms will continue to develop constructively. Accordingly, a group of researchers [34, PP. 23–24] for the first time suggested that the nature of infrastructure platform increases the importance of leadership in governance [43]: sole decentralization can be counterproductive, and strategic leadership can help the platform avoid over-decentralization and losing control over the system;

2) prototyping the platform is already more important than theorized criticism.

Many experiments with blockchain embody policy and politics, i. e. opportunities and limitations they seek to implement in society, and this depends on the political vision these projects are based on. Modern Western and Chinese political science literature contains a rich and contradictory analysis of the possibilities and threats of blockchain technology for politics and the state, so without turning to techno-utopianism and crypto-institutionalism, it is important to critically pay attention to the design features of a blockchain-based decentralized platform. This means that careful prototyping in practice is required, at least with existing DIPs, which could clarify how these DIPs will develop. For example, instead of decentralizing for the sake of decentralization, it is necessary to find out which aspects of specific information systems will function better decentralized, who is their target audience and how to optimally adjust business processes in the service ecosystem? As there are hundreds or thousands of existing centralized information platforms in the world, at least ten quite popular, truly integrated and multifunctional international DIPs are operational, and they can provide a good basis for a modern prototype of platform governance and new knowledge;

3) *joint digital platform governance*. As research has shown [27; 56; 57], the number of information platforms becoming more open is growing. However, most researchers currently focus on the study of open participation rather than decentralized governance. However, open participation is not the same as decentralized governance, as owners of open information platforms can still maintain centralized control over access to their information platform, core interactions and value distribution. If a digital platform is open to participation but is centralized in terms of governance, its owner may have significant power and control over other stakeholders in the ecosystem of the platform. On the one hand, by sharing governance and control rights with platform participants, platform owners can clearly show their intentions to act in the interests of the overall information system ecosystem. On the other hand, having the means to protect their rights and interests, ordinary platform participants may be more interested in being involved in the ecosystems of such platforms. As a result, such platform ecosystems can attract participants even more confidently, create “network effects” and improve overall performance. Once owners of popular centralized information platforms realize the benefits of decentralized governance, they may have an incentive to make their platforms more decentralized.

For instance, Google’s Android platform has a semi-decentralized management structure (Google decentralized its Android through open source code [23], which allowed many user and developer communities to develop Android. However, Google also recognized the need for administrative control over Android through the Open Handset Alliance and Google Play to ensure safety, compatibility and consistency). Facebook did the same offering a semi-decentralized management structure for its blockchain-based Libra payment platform. By promoting shared management through semi-decentralization, centralized information platforms can better engage users, developers, and other stakeholders, potentially enabling them to enhance their networking effects and create greater value in the long run. In general, we believe that

decentralization can be an important strategic factor for existing and future information (digital) platforms, especially the dominant ones. However, full technological decentralization in management can slow down goal setting, decision-making and further development of the entire information platform and ecosystem.

It is worth noting that the analysis of modern literature and our own inductive conclusions allow us to determine the DIP properties for public governance purposes and compare them with those of centralized platforms (Table 1).

This comparison of centralized and decentralized information platforms allows us to give our own definition of the *decentralized information platform* as a type of digital data accounting system based on a distributed ledger technology [31], which consists of a service infrastructure and a community of independent users having equal rights or pre-identified rights granted according to the levels of decentralized governance model to make such a system stable.

Table 1

Comparison of key parameters of centralized and decentralized information platforms

Parameter	CIP	DIP	Consequences of taking into account DIP parameter for public governance needs
<i>A. Relationship system governance</i>			
1. Basic governance principle	Based on acquired rights in the hierarchy and market rules	Based on consensual forms of self-government and direct participation of citizens in decision-making (distributed trust) and market rules	Technological decentralization and use of cryptographic encryption as means of building trust and political arguments; removing intermediaries where possible
2. Participant coordination method	Centralized coordination creates additional added value for owners or higher ranks in the hierarchy, indicating the priority of “economy above politics”	Automatic consensus based on software protocol	A new cheaper way to provide a production “scale effect”; it is a consequence of scaling and increasing the coverage of participants
3. Way of building	Emphasis on	Emphasis on peer-to-	Less transaction costs and

Parameter	CIP	DIP	Consequences of taking into account DIP parameter for public governance needs
relationships between participants	hierarchical web networks with or without clear territory relation and on online interest groups	peer web networks without clear territory relation and on online interest groups	time spent; promoting community participation compared to that of CIP; has great potential for creating new independent micro-communities
4. Leadership	De facto organized minority always represented by developers and owners, etc. (“technical elite”)	(1) either an organized minority, which may sometimes be represented by developers and owners, etc. (“technical elite”), (2) or a disorganized majority	Organized minority may have enhanced rights and may derive additional benefits from information asymmetry and register replication; unorganized majority acquires broader data access rights
5. Incentives	Pricing mechanisms	Crypto-incentives (distributed ledger tokens [31], etc.) and pricing mechanisms	Increased demand for new conditional values (distributed ledger tokens [31]) and backed digital assets [58]; demand for a significantly improved way of value exchange and information accounting
6. Coercing participants to maintain “order”	Exists on the basis of rights in the hierarchy	No coercion at the base level, more equality and freedom for the participant	Improved subject-subject relations, more responsible participation; significantly wider range of roles for individuals (or stakeholders)
7. Decision-making	Centralized (major decisions are made by the platform owner)	Decentralized (community decides on the platform’s future in a democratic way)	Using the distributed architecture of permissioned blockchains for algorithmic control (smart contracts)
8. Taking into account unforeseen circumstances	Relatively flexible and does not require much time	Complicated or delayed due to waiting for a response or finding a new consensus of participants	Possibility to create a consensus model that will be slightly shifted towards decentralization and will be a two- or multilevel model of decentralized governance; increased cost of participant coordination; new conditions can be

Parameter	CIP	DIP	Consequences of taking into account DIP parameter for public governance needs
			added to machine-readable contracts that may indeed be changed in the future
<i>B. Access rights management</i>			
9. Access rules	Always granted	No access	All participants can consciously or automatically build their own organizational structures (networks and hierarchies) and develop part of the rules in them
10. Verification of transactions	Centralized	Decentralized	Transaction disintegration with reduction of transaction costs associated with opportunism and uncertainty
11. Information asymmetry	Exists (owners → “node” managers → participants)	Exists (developers → users; developers → service providers)	Open communities may easily cluster and defend their common position (their rights, requests for changes or new resources)
<i>C. Infrastructure management</i>			
12. Ownership of data infrastructure	Proprietary	Distributed	High requirements for coordination and simplification, increased inspection and storage spending
13. Accessibility of data infrastructure	Private access	Public access	Requirement for reliable connection between a digital record and a corresponding event in the physical world, which requires certain reliable parties (oracles)
14. Data security	Ensured by the platform owner with granting certain rights to trusted developers	Ensured by both the platform owner and multiple replication of independently stored data with granting certain rights to trusted developers	Significantly more reliable data storage; dual data storage also ensures network node transparency
Examples	Facebook, Amazon, Apple, Netflix,	Steemit, Bitcoin, Ethereum, Bitbon	Higher public trust in the country, supporting the

Parameter	CIP	DIP	Consequences of taking into account DIP parameter for public governance needs
	Google, Diia, etc.	System, etc.	sovereignty of the modern state

*Source: author’s development taking into account [15; 16].

Therefore, the above arguments and the DIP definition allow us to move to the next step, which is presenting DIP as a tool for public governance modernization and a new, modern important factor influencing public relations in the country and abroad.

The principle of decentralized construction of complex organizational entities DIP takes into account as well as the known implemented examples of technologically “decentralized autonomous organizations” [59] indicate the ability to easily (at least in theory) “...prototype and experiment with an aspect of our social interactions” [60], which used to be difficult do due to the lack of breakthrough infrastructure layer information technologies (except for the Internet) and their weak connection with social technologies. Despite the fact that modern digital technologies significantly expand the naturally limited human capabilities for interaction, collection and processing, today’s governance processes still depend significantly on the so-called “crutches of centralization”, such as conspiracy of participants, pressure or conspiracy of guarantors, the representatives of which in the field of information and communication technologies (ICT) have been private cryptocurrencies, mining algorithms and API access to blockchain [61], and from the conditional division of people into “participants”, “customers”, and “investors”. That is, we are talking about new human social roles and related functions, the introduction of which was impossible before due to significant difficulties in governing a large number of free and wealthy people, but today is possible due to the development of blockchain technology. Over the last 10–15 years, a number of new governance models have begun to spread around the world, and they try using new tools to increase the transparency and efficiency of governance, including delegated democracy and

“holacracy”. Some modern scientists [62; 63; 64] indicate that at least these two new forms of governance have significant potential in a crisis of direct and representative democracy due to a high degree of egalitarianism, but are so far limited by information access barriers for certain groups.

The technologically implemented principle of decentralization allows:

1) information platforms to increase the influence of its members, while reducing the influence of owners of centralized information platforms on themselves and even on government policy as evidenced by many recent investigations against Ant Group (AliExpress, Alibaba) in China, against Google, Facebook and others in the EU, USA and Australia in 2020–2021;

information platforms to form an organizational structure, through which its private participants can influence, control, and interact with all platform owners [46; 65] motivating platform owners to achieve results that can be more meaningful and acceptable to all;

2) platform participants to participate in setting goals and making social and political decisions that allow them to express their views and defend their interests;

platform participants to use new information, knowledge, and initiative to increase information efficiency of governance processes [66].

As a result, decentralized information platforms much more likely will:

– take into account the interests of ordinary information system participants when a decentralized information platform is being governed;

– technologically promote the general well-being of all participants rather than profits of platform owners;

– act as a new environment for voluntary interaction of all known types of participants in public governance (state and municipal bodies, private entities, non-governmental organizations, political parties, trade unions, etc.).

If decentralized information platforms make governance available to all, members of digital communities can accordingly better represent their interests and

use their local information through technologically advanced operational governance processes. When decentralized digital platforms give some organizations or individuals more control over governance while limiting their power through decentralization, these key players can help ensure effective governance processes and outcomes. For example, they can be useful in jointly defining the boundaries of their community, influencing social relations and governing actions [29]. Since key players provide fairly equitable governance (based on common internal rules and simple evidence through blockchain-based action history), DIPs should not depend solely on the special participation or contribution of members of that community. In difficult and controversial situations, they are less likely to reach a deadlock, as key organizations or individuals can take control of governance processes to overcome deadlocks, constantly maintaining a checks and balances system through decentralization. Owing to partial decentralization (or “semi-decentralization” [67]), information platforms can create a better organizational architecture to quickly take into account different points of view and available information to achieve fairer governance without excessive concentration of power in any of the subjects.

In this public-governance and political context, it is reasonable to consider DIP as an aid to maintaining the political legitimacy of power without cyclical revolutions, which is very relevant in the 21st century.

Thus, when the state is being built and the economy is being developed, special attention should be paid to preventing the disparities in the sociopolitical system of the state that would be able to undermine it, and this requires finding internal consensus while maintaining the course of society development. The modern standard of state regime, namely the democratic one, with all the freedoms and universal suffrage, actually exceeds the achieved level of economic development of many modernizing countries. It is worth mentioning that Western democracy has come a long way from a limited democracy with rigid electoral qualifications to a regime of full democracy, which took place after the economic modernization. But even in this

situation, many countries have not escaped revolutions. As Grinin notes, “the imbalance between the economic level and the political regime (towards any side) poses a threat of collapse” [68, P. 59]. Today, there are many semi- or pseudo-democratic (actually authoritarian) communities and countries that, despite some economic success, face the problems of democracy, and this indicates the risk of losing the legitimacy of power in the eyes of their society. As the events of the Arab Spring of 2011 and the Ukrainian Euromaidan in 2014 show, where the population is not ready for a democratic form of government due to the lack of historical traditions and relevant ideology (or social consciousness, social structure, literacy level), young democracies develop from a coup to revolution or another coup. Thus, state building makes it very important to develop such mechanisms of public governance that could neutralize or compensate for the gap between the lower level of economic and cultural development and higher forms of political regime [68, P. 59]. In this sense, given the implications of taking into account the DIP characteristics for public governance (see Table 1), DIP has the potential to neutralize or compensate for the gap between lower levels of economic and cultural development and higher forms of political regime through ensuring transparency, democracy, and problems for administrative abuses by governing bodies.

6. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

The following conclusions can be drawn based on the generalization of predictive methodology and own reflection:

1. Decentralized information platforms have an extensive potential and can be considered as a very promising tool for modernization of public governance as a system. In particular, this refers to forming proactive impact on a citizen, on the one that has the ability and capacity to take active part in day-to-day activities of the government due to the development of a new democratic model using tools provided by electronic democracy.

2. It is suggested that the “*decentralized information platform*” means a type of digital data accounting system based on a distributed ledger technology, which consists of a service infrastructure and a community of independent users having equal rights or pre-identified rights granted according to the levels of decentralized governance model to make such a system stable.

3. The important task of civil society and renewed public governance system will soon lie in studying new political and social dimensions in order to integrate applications of the latest breakthrough technologies, such as blockchain, with civil rights, equality, social cohesion, and public sector security. Such integration is very important, and it cannot be left to the discretion of (anti-)political engineering of IT experts, financial investors and political populists as it truly requires mature and interdisciplinary efforts from all areas of human knowledge with special attention paid to political theory and social sciences to assess risks, advantages, and results of new technologies in the best way possible.

The prospects for further research are related to the description of existing business models of decision-making, communication with stakeholders and implementation of decisions in public governance and their improvement using decentralized information platforms and with the possibility of applying a project approach to digital transformation of modern state functions and prototyping interaction of decentralized information platforms with the state on the basis of successful existing DIPs, such as the domestic **Bitbon** System.

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