THE INFORMATION AND COMMUNICATION SUPPORT OF PUBLIC AUTHORITIES IN UKRAINE IN THE CONTEXT OF USING KNOWLEDGE MANAGEMENT IN HUMAN RESOURCES

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Abstract. *This article explores the theoretical foundations of information and communication support in public authorities, presents an analysis of a set of models of communication management, and considers various information and communication spaces in public administration. The authors define key directions in the modernization of the information and communication support of public authority activitities in modern Ukraine. Emphasis is placed on the need to develop a system of professional training in the field of cybersecurity following the experience of the US in this area, and use of knowledge management tools is suggested in order to improve the information and communication support of public authorities in Ukraine. This article studies US educational institutions that conduct training in the field of cybersecurity, and defines a set of knowledge management tools including knowledge networks as a process of: human and computer interaction where people exchange information, knowledge, and experience to develop new knowledge and solve new issues; combining knowledge, experience, talents, skills, and capabilities in models that are constantly changing. It also describes open space technology as a method that helps this community to be more effective by developing shared solutions. This article concludes that*

the issue of the information and communication skills of civil servants is becoming increasingly relevant in the conditions of transformations, and it is important to master new communication technologies to apply them when making managerial decisions.

Key words: *public administration, public authorities, information, information and communication support, information and communication technologies, change management, cybersecurity, knowledge management tools.*

Reikšminiai žodžiai: *viešasis administravimas, valdžios institucijos, informacija, informacijos ir komunikacijos palaikymas, informacijos ir komunikacijos technologijos, pokyčių valdymas, kibernetinis saugumas, žinių valdymo priemonės.*

Introduction

In present-day Ukraine, decentralization is changing the ideology and format of interaction between state and society. State bodies' delegation of certain functions and powers to territorial communities, and even to civil society, is becoming increasingly common. At the same time, these newly acquired powers require the appropriate competences of the management and employees of public authorities, and the effectiveness of their managerial decisions increasingly depend on both the depth of their understanding of the pressing social and economic problems and their ability to use up-to-date, innovative technologies to develop a variety of alternative approaches to solving new tasks and challenges. Therefore, in a time of constant change, modern civil servants face the important task of mastering and using information and communication tools for the development and implementation of key managerial decisions.

Research findings and discussion

The development of modern states in the era of an information society has seen an unprecedented increase in the role and importance of information technology in all spheres of society – particularly in public administration – as the social and political development of any state today is closely linked to its information support and development (CoPfLG 2010). Therefore, the issue of ensuring the appropriate level of scientific validity for the development, adoption, and implementation of managerial decisions in public administration systems in general – and in their information and analytical support in particular – is gaining importance; hence the need to develop and introduce fundamentally new or radically modernized approaches to their implementation (Dale 2010).

The theoretical foundations for the study of the information and communication support of public authorities have been laid down by a number of Ukrainian and international scholars including: Bystrova (2017); Karpenko (2010); Gatsyuk (2019); Dreshpak (2015); Fyshchuk and Evsyukova (2020), Konotoptsev (2014); Bukhtatiy, Radchenko, and Golovchenko (2015); Cobbold and Lawrie (2002); O'Leary (2016); and Honcharuk (2010).

In the process of its development, a civil society should become increasingly "public", which means an increasing level of engagement of the population, citizens, the public, self-governing organisations, and so forth, in the decision-making process. In a democracy, when the level of development of a civil society is high enough, state power turns into public administration, and becomes significantly dependent on society (Dreshpak 2015).

In general, communication in public administration is a process of social interaction through messages, the content of which relates to public administration and the implementation of public authority and policy. Thus, communication in public administration can be divided into two forms: internal and external, which aim at solving the problem of interaction of subjects within and outside the system of public administration, respectively (Dreshpak 2015).

There are also a number of types of communication that depend on certain parameters by which communication is considered (Dreshpak 2015).

In Ukrainian scholarly literature, the term "information space of public administration" is often used in parallel with the term "communication space of public administration". However, despite having some common features, certain key differences exist between these terms. Comparative analysis of the components of information and communication in public administration allows for the identification of commonalities, differences, and specific features. This analysis was carried out according to the following parameters: elements (with the main element identified); relations; processes; and borders (Table 1).

Table 1. **An analysis of the components of information and communication in public administration**

Analysis parameters	Public administration spaces	
	Information	**Communication**
Elements	data, databases, information technologies, information systems, subjects of information relations	addressee, messages, message encoding / decoding systems, communication channel, addressee, feedback
The main element	information as information and / or data	message as a meaning, "packaged" in a certain semiotic form
Relations	subject – infrastructure – information (data)	subject – communication – subject
Processes	creation, dissemination, consumption of information	creation, distribution, consumption of messages
Borders	powers and functions of the public administration system	powers and functions of the public administration system, real and potential audience

Source: Dreshpak (2015); Gatsyuk (2019)

Management of communications in the field of public administration is associated with the growth of cyber threats and cybercrime, and cybersecurity is an important component of the information and communication support of public authorities. Cyberspace is increasingly being used for political and ideological purposes, and growing international polarization is hampering effective multilateral development. Hybrid threats combine disinformation campaigns with cyberattacks on infrastructure, economic processes, and democratic institutions. These threats can potentially cause physical harm, allow unauthorized access to personal data, steal trade or state secrets, sow distrust, and weaken social cohesion. Such actions undermine international security and stability, and devalue the benefits of cyberspace for economic, social, and political development – as noted in the EU Cyber Security Strategy for the Digital Decade of 12 December 2020 (European Commission 2020).It is significant that the world's foremost educational institutions in the field of cybersecurity include predominantly American higher education institutions, which are listed below (Table 2).

Table 2. **US educational institutions that provide training in the field of cybersecurity**

No.	Name of educational institution	List of cybersecurity programs
1.	California State University SANBERNARDINO	Center for Cybersecurity (CSUSB), which offers the best programs in cybersecurity (MBA - Focus on Cybersecurity; Public Administration and Cybersecurity; National Research in Cybersecurity; Information Systems and Technologies BC and Cybersecurity; Forensics - Cybercrime, etc.).
2.	Carnegie Mellon University	The Institute for Security and Confidentiality, which offers master's programs in cybersecurity (information technology and privacy design; information security and management; information security, etc.).
3.	The George Washington University	The Institute for Cybersecurity and Confidentiality Research operates within the School of Engineering and Applied Sciences, whose specialists are involved in developing the world's best cybersecurity programs (cybersecurity in computer science; cybersecurity strategy and information management; cybersecurity and compliance policy; national security US law, professional research in cybersecurity, etc.).
4.	Indiana University BLOOMINGTON	Center for Applied Cybersecurity Research (CACR), which offers master's programs in cybersecurity (master's of business administration with a focus on cybersecurity, cybersecurity in computer science, cybersecurity strategy and information management, cybersecurity policy and compliance; US law, professional research in cybersecurity, etc.).
5.	Kansas State University	The Center for Information and Systems Support (CISA) operates in conjunction with the National Center for Academic Achievement in Cybersecurity Research, which offers one of the best cybersecurity programs in the world (Cyber Security BS; Master of Software Engineering; Bachelor of Computer Science).

No.	Name of educational institution	List of cybersecurity programs
6.	Penn State College of Information Sciences and Technology	Offers a wide range of quality programs for students and graduate students in cybersecurity (Master of Professional Research in Information Science - Cybersecurity and Information Security; Bachelor of Security and Risk Analysis - Information Security and Cybersecurity option; Master of Professional Research in National Security - Specialization in Information Security and forensics, etc.).
7.	University of Maryland and Global Campus Formerly UMUC	Has a reputation as one of the best cybersecurity schools in the world, and offers programs for students and graduate students (cybersecurity management and policy, master's program and undergraduate program; computer networks and cybersecurity, undergraduate program; software development and security, undergraduate program; digital forensics and cyber-investigation master's program; information technology in the field of information support, master's program; etc.).
8.	The University of Texas at San Antonio (UTSA)	There are such research centers as the Center for Infrastructure Security and Protection, the Institute of Cyber Security and the Cyber Security Cente,r and analysts who provide training programs (business administration in the field of information systems; information technology and cybersecurity, etc.).

Source: systematized by the authors

Thus, the training of cybersecurity professionals in the United States is based on the mastery of modern information technology alongside fundamental and applied research disciplines, which allows a high level of theoretical and practical training to be obtained. This analysis shows that the United States pays great attention to strengthening national security and protecting civil rights and business interests. This is because the scientific, technical, military, financial, and high-tech potential of the United States is the national property of the American people, and is in need of protection at the state level. The concentration of the largest financial companies, research institutions, and corporations – which significantly affect the financial stability and economic development of the country – along with the creation and development of important technological processes, increases the importance of cybersecurity management in the United States (Cybersecurity & Infrastructure Security Agency 2003).

Today, the proper use of information and communication support in public authorities depends not only on the formation of effective systems, but also on the training of civil servants in this area. The Knowledge Management research on the use of knowledge management tools is, in the view of the authors, noteworthy, as it represents an innovative trend among public authorities in Ukraine (DESPRO 2013).

When it comes to knowledge management technologies, researchers collect information from both data and texts, first understanding the general meaning, then selecting generally significant indicators and information that are stored in repositories and are present in input streams. These indicators are based on: statistical modeling, neural networks, genetic algorithms, etc.; document management systems involving the storage,

indexing, and archiving of documents; means of organizing shared work, i.e., the internet and teamworking technologies; corporate knowledge management portals; expert systems; and discussion systems (O'Leary 2016).

The set of knowledge management tools includes:

1. Review of the performed activity. This tool provides an opportunity for the actors involved in a project to obtain information on how a situation develops, its advantages and disadvantages, potential improvements, and the results and conclusions that can be obtained from prior experience. In using this technique, the priority is openness and learning, without fixing the problem of the phenomenon or situation being studied, and not in a way that relates to the evaluation of participants. One positive aspect of this is that the acquisition of experience during the project is immediate, as it is immediately applied in practice (U.S. Army Corps of Engineers 2003).

2. The Balanced Scorecard (MAP) is a tool for implementing the monitoring of organizational strategy through components such as financial and non-financial measures (Niven 2006). This tool provides for the definition of four balanced perspectives: finance; consumers; the perspective of the internal process; and learning and growth – which allow users to translate vision and strategy into specific tasks and activities. Thus, the manager or the head of the public authority should choose up to 5–6 goals within each of the prospects, and then, by determining cause-and-effect relationships (presented in the diagram), should demonstrate the relationships between these goals. As a result of reaching a consensus on the tasks and their relationships, a map of balanced scores is developed in the process of selecting appropriate measures to address a particular task (Balanced Scorecard Institute, n.d.). In using this tool, the priority is to create a framework for translating a strategy into a coherent set of performance indicators, which provides a more contextual justification of the selected measures and facilitates the development of public authorities. A positive outcome of this is that the grouping of performance indicators into general categories (defined as perspectives by the authors of the methodology) makes it possible to collect and subsequently single out the relevant performance indicators of the public authority (Cobbold and Lawrie 2002).

3. The capitalization of experience involves the transformation of (individual and institutional) knowledge into capital, which is performed by persons involved in the process of changing collective institutional practice. The purpose of knowledge capitalization is to change certain personal practices of individuals or structures. This method is used to review the experience of acquiring knowledge. The embodiment of knowledge capitalization is the learning process, which leads to change through existing but hidden experience. It provides a transition to change, or forms a step in a process of change that has already begun, creating a fundamental basis for a planned and focused sequence of change. It should be noted that although the capitalization of experience is carried out by the "owners" of the experience, it can be used by any person seeking to change a practice. It is

noteworthy that every civil servant is constantly in the process of learning within their own activities.

4. Knowledge networks are a process of human and computer interaction in which people exchange information, knowledge, and experience to develop new knowledge and solve new issues by combining knowledge, experience, talents, skills, and capabilities in models that are constantly changing. As a category, the knowledge network has the following features: 1) the absence of a hierarchical structure of knowledge networks that is self-regulating and self-organizing, and the presence of an informal internal structure with a small number of active members and a large number of passive members; 2) interaction within the knowledge networks of subjects that produce knowledge, which is based on the exchange of relations, the mutual exchange of services, and the involvement in communication in these networks of many subjects of public authorities; 3) the variability of subjects' affiliation to different networks of knowledge and the different aspects of their impact on the information space (such as discussion forums, expert seminars, advocacy, or the multilateral discussion of a particular event or phenomenon in society); 4) the impossibility of mapping the knowledge network, as they are characterized by a change in the boundaries and effectiveness of the impact on the relationship of the subjects who use them; 5) the specially-selected and spontaneously-formed set of knowledge produced by these networks; 6) the main purpose of the functioning of knowledge networks, which is to meet the communication needs of society to achieve common goals; 7) the presence of nodes and links as structural components of knowledge networks, with the former being the main entities that provide activities or formal organizational processes, and the latter creating channels, ways to communicate, and knowledge flows, as well as building isolated relationships.

5. Lessons learned. This tool of knowledge management is of some interest in the context of the development of management experience in the direction of implementing practical tasks for the management of public authorities. In the process of its implementation, the "Lessons Learned" methodology has the opportunity to collect, consolidate, amd document the experience, development, errors, and risks that became apparent during the implementation of a certain socially important reform. Learning lessons makes sense at the end of a certain stage of social transformation, allows for analysis of the range of efforts of public administration, and encourages the public to analyze valuable information that can be useful in planning and implementing further public reforms. The lessons learned are related to mistakes, and allow for the avoidance of those mistakes in future.

In the opinion of the authors, the main directions in the modernization of the information and communication support of public administration agencies in Ukraine include: expanding electronic forms of communication; developing and using "hybrid" forms of communication; and ensuring effective communication in the process of management, in particular by establishing effective professional communication among

public servants during the development, implementation, and evaluation of decisions. Emphasis should be placed on improving the mechanisms of information and communication support in public authorities through the introduction of educational programs that teach staff how to use new information technology, developing digital skills and thus improving digital literacy. The situation brought about by the COVID-19 pandemic has strengthened the public perception of the urgent need for the development and modernization of information and communication support in public authorities.

Conclusions.

1. Information and communication interaction in public authorities is usually handled by the relevant structural units and/or individual specialists. Their activities should be aimed at ensuring effective and efficient communication between public administration agencies and the public, businesses, and other agencies, and should be based on public authorities' shared principles of openness, which are to be implemented during information and communication activities.
2. Transparency and openness are becoming important levers of influence and trust for public servants in the context of transformation. Public authorities need to keep in mind a number of general principles and skills in communicating with citizens and the media. The possession of new skills regarding information and communication technology and the ability to implement them during work with citizens and knowledge management activities will be essential in the human resources process.
3. Ukraine is still developing information and communication tools in the knowledge management of human resources in the civil service. The current reform of the public administration system, in cooperation with the European Union, will help to improve skills and abilities. The COVID-19 pandemic has strengthened the requirements for digital literacy skills and the ability to respond quickly to issues in accordance with existing regulations. Communication and information have become extremely important tools for society, but the most essential are still those that involve security of public data and information.
4. Cyberspace is increasingly being used for political and ideological purposes, and growing international polarization is hampering effective multilateral development. Hybrid threats combine disinformation campaigns with cyberattacks on infrastructure, economic processes, and democratic institutions, which can potentially cause physical harm, allow unauthorized access to personal data, steal trade or state secrets, sow distrust, and weaken social cohesion.

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Informacijos ir komunikacijos palaikymas tarp Ukrainos valdžios institucijų, žmogiškųjų išteklių srityje naudojant žinių valdymą

Anotacija

Straipsnyje nagrinėjami teoriniai informacijos ir komunikacijos palaikymo viešojo sektoriaus institucijose principai, pateikiama komunikacijos valdymo modelių analizė ir atsižvelgiama į įvairius viešojo administravimo informacijos ir komunikacijos aspektus. Autoriai apibrėžia pagrindines valdžios institucijų veiklos šiuolaikinėje Ukrainoje informacijos ir komunikacijos palaikymo modernizavimo kryptis; nurodoma būtinybė plėtoti profesinio mokymo kibernetinio saugumo srityje sistemą, atsižvelgiant į JAV patirtį šioje srityje. Siūloma naudoti žinių valdymo priemones, siekiant pagerinti Ukrainos valdžios institucijų informavimo ir komunikacijos palaikymą. Straipsnyje nagrinėjama JAV mokymų organizavimo įstaigų, vykdančių mokymus kibernetinio saugumo srityje, veikla. Autoriai identifikuoja žinių valdymo įrankių rinkinį, įskaitant žinių tinklus, žmogaus ir kompiuterio sąveiką derinant žinias, patirtį, talentų parinkimą, įgūdžius, modelių kaitą. Atvirosios kosmoso technologijos apibūdinamas kaip metodas, kuris padeda bendruomenei būti efektyvesnei, kuriant bendrus sprendimus. Daroma išvada, kad piliečių informavimo ir bendravimo įgūdžių klausimai bei vadovų sprendimai, veikiami naujų komunikacijos metodų viešojo sektoriaus transformacijų sąlygomis, tampa vis aktualesni.

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