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## LEGAL FRAMEWORK FOR THE DIGITALIZATION OF LOCAL GOVERNANCE IN THE CONTEXT OF ROBOTIC AND INTELLIGENT SYSTEM INTEGRATION
## ПРАВОВЕ ЗАБЕЗПЕЧЕННЯ ЦИФРОВІЗАЦІЇ МІСЦЕВОГО САМОВРЯДУВАННЯ В КОНТЕКСТІ ІНТЕГРАЦІЇ РОБОТИЗОВАНИХ ТА ІНТЕЛЕКТУАЛЬНИХ СИСТЕМ

*In the context of society's digital transformation, integrating digital technologies into the governance of territorial communities is becoming increasingly important. Since the onset of Russia's full-scale military invasion of Ukraine, reform initiatives—particularly the reform of territorial communities—have faced significant challenges. Nevertheless, despite difficult conditions, including budget constraints, a shortage of resources, and limited personnel, communities continue to implement digital processes at the local level actively. Purpose of the study: to examine the legal framework for the digitalization of territorial community governance in the context of the implementation of robotic and intelligent systems. Research methods: analysis, synthesis, induction, deduction, and comparison; systems approach; abstraction and forecasting methods; historical and dialectical methods. Research results. Digital transformation is occurring progressively through the phased introduction and continuous refinement of new technologies. For Ukraine, currently during active hostilities, digital technologies have become not only a driver of economic development but also a factor of stability, security, and adaptation to emerging challenges. The use of digital solutions is an effective means of addressing urgent issues; it is a necessity of the present and an opportunity for communities to build a resilient infrastructure that meets the needs of their residents. The research findings can assist territorial communities in setting priorities for organizing a secure electronic environment.*
*Keywords: territorial communities, digitalization, robotic systems, intelligent systems, governance, implementation, legal framework.*

*У контексті стрімкої цифрової трансформації суспільства, інтеграція сучасних технологій в систему управління територіальними громадами набуває стратегічної важливості. З початку повномасштабної військової агресії росії проти України реформаторські ініціативи, зокрема децентралізація та реформа територіальних громад, зіткнулися з безпрецедентними викликами, включаючи бюджетні обмеження, дефіцит ресурсів та кадровий голод. Незважаючи на ці складні умови, громади демонструють високий рівень адаптивності, продовжуючи активне впровадження цифрових процесів на місцевому рівні. Метою дослідження є всебічне вивчення та аналіз правового забезпечення цифровізації управління територіальними громадами. Особливий акцент зроблено на законодавчій базі, необхідній для необхідній для успішного впровадження роботизованих та інтелектуальних систем у муніципальні процеси. Актуальність теми зумовлена тим, що ці системи можуть стати ключовим інструментом для підвищення стійкості, прозорості та ефективності місцевого самоврядування в умовах постійної загрози. Методологічна база дослідження ґрунтується на поєднанні загальнонаукових методів, таких як аналіз, синтез, індукція, дедукція та порівняння, із спеціальними методами: системним підходом, що дозволяє розглядати управління як інтегровану структуру; методами абстрагування та прогнозування для оцінки довгострокових наслідків цифрових рішень; а також історичним та діалектичним методами для простеження еволюції правових норм у динамічному середовищі. Результати дослідження підтверджують, що цифрова трансформація є прогресивним процесом, який вимагає поетапного впровадження та постійного вдосконалення технологій. Для України цифрові рішення стали не лише рушієм економічного розвитку, а й фактором стійкості, безпеки та адаптації до кризових викликів. Використання роботизованих та інтелектуальних систем є необхідністю сьогодення, оскільки це дозволяє громадам розбудовувати надійну та стійку інфраструктуру. Наукові висновки можуть стати практичною допомогою територіальним громадам у визначенні пріоритетів щодо створення захищеного та безпечного електронного середовища.*
*Ключові слова: територіальні громади, цифровізація, роботизовані системи, інтелектуальні системи, управління, впровадження, правове забезпечення, військова агресія.*

### Statement of the problem

In the context of society's digital transformation, the importance of integrating digital technologies into the governance of territorial communities is steadily increasing. Various forms of digital technology and high-speed Internet access are being developed and implemented, as their absence may lead to digital lag, which in turn exacerbates social inequality and restricts human rights and freedoms. Digitalization serves as a foundation for the development of the digital economy. It is therefore a key element in achieving sustainable economic and societal development. Technologies such as the Internet of Things, cloud computing, electronic identification, and artificial intelligence play a crucial role in this process, supporting the implementation of the UN Sustainable Development Goals.

Since the onset of Russia's full-scale military invasion of Ukraine, reform initiatives, including the reform of territorial communities, have encountered serious challenges. Nevertheless, despite difficult circumstances – such as budget constraints, resource shortages, and limited personnel – communities continue to actively implement digital processes at the local level. The determination of communities to build a digital nation has become a vital factor in maintaining stability both regionally and nationally, even during wartime.

At the current stage, this issue is being studied by scholars such as N. Gavkalova, D. Eryomka, S. Kovalenko, V. Lutsenko, V. Proskura, M. Khaustova, Yu. Shulzhyk, among others. Despite notable progress made by researchers in the digitalization of territorial communities, many issues related to their digital capacity remain unresolved and require further investigation. This underscores the need for deeper exploration of the topic, particularly regarding the development of a modern digital community and the key obstacles hindering the digital transformation of territorial communities in Ukraine due to large-scale cyberattacks by Russia. It also highlights the prospects and measures for enhancing their digital effectiveness.

### The purpose of the research

The objective of this study is to examine the legal framework for the digitalization of territorial community governance in the context of implementing robotic and intelligent systems.

To achieve this goal, the study employs general theoretical research methods, including analysis, synthesis, induction, deduction, and comparison, to define the content and components of the concepts of "digitalization" and "territorial

community." A systems approach is applied to synthesize the key methodological principles ensuring the digitalization of territorial governance. The methods of abstraction and forecasting are employed in the analytical collection of theoretical material about the nature and application of digital processes in communities. The historical method is employed to examine the adoption of regulatory legal acts related to the digitalization of communities in Ukraine. The dialectical method is used to analyze governance mechanisms of territorial communities based on digital technologies.

## Presentation of the main research material

At the present stage, territorial communities of Ukraine are undergoing significant changes and intellectual transformations. On April 1, 2014, the Government approved the Concept for Reforming Local Self-Government and Territorial Organization of Power (Resolution of the Cabinet of Ministers of Ukraine No. 333-r). It approved the Action Plan for its implementation (Resolution of the Cabinet of Ministers of Ukraine No. 591-r, dated June 18, 2014). The reform aimed to create capable communities that could ensure their own sustainability and self-development, enabling them to address local issues independently. This marked the beginning of the decentralization of power and the transfer of authority to local self-government bodies.

According to the Constitution of Ukraine (Articles 140-143), a territorial community consists of the residents of one or several settlements who voluntarily unite to address local issues. This includes the election of a village, settlement, or city mayor, who heads the executive body of the council and presides over its sessions, as well as the election of village heads and council deputies who represent the community's interests. Communities have the right to manage municipal property, approve programs for socio-economic and cultural development, oversee their implementation, approve local budgets, and monitor their use. They can also establish local taxes in accordance with the law, conduct local referendums, and implement their results. Furthermore, they have the authority to create, reorganize, and liquidate communal enterprises and institutions and oversee their operations [3].

The Civil Code of Ukraine defines territorial communities as legal entities with their own accounts and revenues, with the right to establish communal enterprises, educational institutions, and commercial companies, and participate in their activities on equal terms [12].

Thus, local development is the process of changes in the structure of a territorial community aimed at improving the quality of life. It involves cooperation between the interests of the community, businesses, and local self-government bodies to enhance the well-being of each community member.

Digitalization of territorial communities represents one of the key aspects of management modernization, aiming to enhance efficiency, transparency, and accessibility for residents [14, 15]. While digitalization should not be regarded as a universal solution to all public administration issues, it is an essential component and a specific stage in the digital transformation of society and government structures. This process is actively unfolding in leading countries, already demonstrating the advantages it provides to local authorities [1, p. 31].

On March 3, 2021, the Cabinet of Ministers of Ukraine approved the National Economic Strategy for the period until 2030 [6]. This document outlines the directions, principles, and values in economic policy, emphasizing the importance of developing an effective digital state and compact government institutions. One of the key aspects of the strategy is the development of the digital economy, which will contribute to economic growth in Ukraine. On the same day, the government approved the Concept for the Development of Digital Competence [4] and the plan for its implementation. This decision is a strategic step in the formation of a digital state.

The government of Ukraine is actively implementing measures to stimulate the digitalization of society and the development of the digital sector of the economy. Among the key initiatives is the introduction of electronic payments and the improvement of the regulatory framework for e-commerce. To implement these and other projects, the Regulation on the Ministry of Digital Transformation of Ukraine [8] was adopted on September 18, 2019. This document establishes the legal framework for the Ministry's functioning, outlining its main principles, goals, and areas of activity. According to the Regulation, adopted by a resolution of the Cabinet of Ministers of Ukraine, the Ministry of Digital Transformation of Ukraine serves as the central executive authority under the Cabinet of Ministers' management and coordination.

On August 14, 2021, the Law "On Stimulating the Development of the Digital Economy" [9] came into force in Ukraine, establishing the organizational, legal, and financial foundations for the legal regime of Diia City. This regime is implemented to promote the development of Ukraine's digital economy by creating conditions that support innovative businesses, expand digital infrastructure, attract investments, and skilled professionals.

Currently, the primary laws in the field of information security in Ukraine include the "Law on National Security of Ukraine," the "Law on the Basics of Cybersecurity of Ukraine," and the "Law on the Protection of Information in Information and Telecommunication Systems." Also crucial for supporting digital transformation are provisions of the "Law on the Fundamentals of Cybersecurity of Ukraine" [10], which detail the concepts of cybersecurity and cyber defense [5, p. 64]. This law does not regulate liability for AI malfunctions, while the "Law on Electronic Communications" does not account for wartime restrictions on internet access.

Digital transformation in territorial communities involves a range of measures to modernize and improve processes by reengineering technological and organizational foundations. These changes are based on implementing digital communications and data exchange to foster closer interaction with citizens, aiming to meet their needs and expectations [16, p. 37].

One of the primary objectives outlined in the State Strategy for Regional Development for 2021-2027 is the digital transformation of communities. The strategy, developed by the Ministry for Communities and Territories Development of Ukraine, covers several areas, including transitioning all services to an online format and creating programs and projects to ensure a comfortable and safe living environment.

The implementation of artificial intelligence (AI) and neural networks in public administration brings new opportunities, as well as significant risks, including:

1. ***Data Leakage and Cybersecurity***: The use of AI requires processing large volumes of data, including citizens' personal data. This creates risks of data breaches and cyberattacks.

2. ***Lack of Transparency***: AI algorithms may make decisions that are not always understandable to humans. This leads to issues related to transparency.

3. ***Discrimination***: AI algorithms may be biased if they are trained on data that contains historical biases. This can lead to discrimination against specific population groups.

4. ***Dependence on Technology***: As the use of AI in management increases, so does dependence on technology. This may lead to problems if systems malfunction or are attacked. It is crucial to have backup plans and mechanisms to ensure the continuity of government operations in the event of technological failures.

5. ***Reduced Role of Humans in Decision-Making:*** The implementation of AI may reduce the role of humans in the decision-making process. This could lower the quality of decisions, as machines cannot account for all nuances and context. It is essential to maintain a balance between automation and human oversight. Thematic research shows that, in some cases, automated systems are unable to adequately respond to non-standard situations, leading to erroneous decisions [17, p. 267].

However, today, improving the effectiveness of territorial communities in Ukraine is impossible without implementing modern information and communication technologies. Their use helps enhance the quality of interaction between the authorities and citizens, and it also fosters social innovations in the country. As international experience shows, increasing the digital capacity of a community allows citizens to independently access information, government services, schedule appointments, and more, thus forming progressive "digital" communities. The introduction of "digital government" elements into local self-governance is actively developing and represents a relevant trend in Ukraine. Information and communication technologies are becoming increasingly "smart," and the balanced development of network infrastructure and the market unites all service sectors into a single system. By using artificial intelligence, it is possible to optimize social content for each consumer and transform this data into tools for financial service providers. While these processes are more actively developing in cities, they have also become popular in newly established territorial communities.

The success of decentralization reform requires improving the effectiveness of territorial communities in areas such as education, healthcare, social protection, energy, public transportation, and security. This is achieved through the implementation of new digital processes, the development of modern technological solutions, the expansion of independent network communications, and the adoption of digital tools for the exercise of community powers [2].

Digital transformation of territorial communities has several positive aspects:

• Wide application of modern information and communication technologies to achieve desired results and effects;

• Ensuring effective management decision-making through the collection and storage of statistical data over the years, analysis of this data for a quick response to community challenges, and action planning;

• Identifying best practices: To achieve optimal results, research and forecasting are necessary, taking past data into account;

• Exchange of standardized documents;

• Reducing the risk of corruption in all sectors at all levels, as citizens use electronic services without direct interaction with officials;

• Ensuring transparency and control throughout the analysis and decision-making process;

• The ability to receive services online during martial *law* [11, p. 10-11].

Here are examples of AI systems used in the management of territorial communities:

1. Digital Twin Platform: Provides comprehensive development of urban infrastructure and its improvement considering various conditions. It allows the user to modify model parameters in real-time, analyze, and choose the most suitable development scenario.

2. Geointellect.Urban: Analyzes the accessibility of infrastructure objects and then evaluates the quality of life in the area.

3. Urbanist AI: A system that aids in visualizing images of urban space. By adding a photograph of an urban object, the solution allows for evaluating how changes will affect the city's appearance.

4. rTIM: A platform that can quickly create development concepts for territories, considering over 140 parameters and the terrain. It simultaneously calculates the project's economy and plans the sequence of construction.

5. Deepblocks: An analytical tool that processes large-scale images based on AI for the analysis of drone, satellite, and aerial photographs. The platform can detect and classify areas of interest, as well as track changes in images taken in the exact location at different times.

The development of "smart" cities and villages is becoming increasingly relevant (see Table 1).

**Table 1. The Impact of "Smart City" Technologies on the City**

| Technology | Impact on the City |
|---|---|
| "Smart" Public Transport | This allows for the control of all events inside and outside the vehicle during movement, utilizing geolocation data and transmitting information about violations to the relevant authorities. |
| Citizens-Government | Distribution of responsibilities and the creation of a reliable cooperation mechanism between the state and citizens. Establishing effective communication between city residents and executive authorities, ensuring transparency in the city's administrative activities. |
| 5G Technology | Currently, 3G/4G networks can no longer meet the requirements of advanced technologies necessary for the functioning of smart cities. Therefore, the implementation of 5G is a necessity. |
| Geolocation Technologies | These provide the core platform for creating solutions aimed at the development of smart cities and communities. This is because planning requires precise work, deep analysis, and the use of reliable, dynamic data about the location of objects. |
| Artificial Intelligence | The implementation of artificial intelligence provides communities with a deep understanding of how it functions. It helps in the effective planning of public transport routes and parking spot locations. Additionally, AI ensures the safe integration of autonomous vehicles and shared transport systems into the city's transport infrastructure, and it also improves the management of electricity and water supply systems, as well as waste collection and disposal processes. |
| Integration of Robots into Urban Infrastructure | Cities like Dubai, Tokyo, and Singapore, among the most developed in the world, are transforming into true smart cities, where robots coexist harmoniously with humans and provide a variety of services. |

*Source: developed by the author.*

The introduction of innovative technologies in energy saving, public services, public transport, and security improves the quality of life for residents. The use of monitoring systems, sensors, video surveillance, and energy-efficient networks also supports the sustainable development of communities. The war has profoundly altered economic processes in Ukraine, also impacting the digital sector. Despite the ongoing hostilities, the IT industry not only continues to operate but also adapts and grows, ensuring a significant flow of foreign currency. Many IT professionals have relocated abroad or to the western regions, which stimulates the formation of new technological clusters. Considerable progress is noticeable in the field of electronic government services: the "Diia" platform has become an example of successful digital service implementation, providing citizens with quick access to social benefits and administrative services even during the war. At the same time, the growing threats in cyberspace have pushed the government and businesses to actively enhance cybersecurity systems, which have become a crucial part of national security.

The digitization of the military sector also holds great importance. The use of artificial intelligence, drones, satellite communication, and big data analytics helps conduct combat operations more efficiently and better coordinate defence strategies [13].

To successfully manage at the level of territorial communities amid wartime challenges, strategies must be implemented that allow for quick responses to threats and their anticipation. Based on research and the experience of communities, the key approach is digitalization, which includes:

- Development of programmatic documents for community development based on the principle of homeostasis, particularly a strategic plan for risk and threat prevention and management. Existing development strategies, adopted before the full-scale invasion, need immediate adjustment to meet wartime requirements, prioritizing the strengthening of the country's defence capabilities.

- Finding ways to manage complex and global issues, particularly through the formation of project teams involving representatives from large and small businesses, as well as the public sector.

- Ensuring effective communication at all levels of governance, which includes promptly informing the community about current challenges and threats.

- Developing cooperation with the public and business sectors to establish partnerships, strong ties, and exchange of ideas.

- Promoting the development of small and medium-sized businesses and stimulating the local economy, for example, through investment projects within communities, attracting international technical assistance, and supporting business relocation.

- Supporting new leaders – agents of change – who can mobilize the community to address complex issues, finding unconventional solutions during crises, and transforming challenges into opportunities for territorial development.

During times of crisis and wartime challenges, it is crucial to distinguish between non-urgent and secondary tasks that may divert resources and create additional barriers to implementing the community's strategic development plan. These lower-priority tasks should be delegated to lower levels of management to minimize resource expenditure on their resolution [7, p. 26-27]. Table 2 presents the key areas of digital transformation for territorial communities in Ukraine, along with measures that should be developed to enhance their digital capacity.

**Table 2. Prospects of Digitalization in the Management of Territorial Communities**

| Prospects | Measures for Implementation |
|---|---|
| Development of Digital Infrastructure | - Expanding access to high-speed Internet, especially in rural areas.<br>- Establishing modern data centers for data processing and storage.<br>- Integrating secure cloud solutions into the work of local government authorities. |
| Automation of Management Processes | - Implementing electronic document management and digital registers to optimize information processing.<br>- Ensuring electronic voting and citizen identification to simplify democratic processes.<br>- Using blockchain technology to increase transparency in public procurement and registry management.<br>- Automating administrative processes to reduce corruption risks.<br>- Creating an integrated platform for managing community budgets to improve financial organization. |
| Enhancement of Data Transparency and Openness | - Using open data to track community activities.<br>- Implementing electronic control tools by the public.<br>- Increasing information accessibility for citizens through digital platforms. |
| Development of Digital Democracy | - Introducing electronic consultations and surveys to engage with citizens.<br>- Developing a platform for public participation in the budgeting process.<br>- Using digital technologies to support citizen self-organization. |
| Modernization of Service Delivery Systems | - Implementing electronic services for access to administrative services.<br>- Expanding the capabilities of the "Diya" platform to create new services for residents and businesses.<br>- Using mobile applications for effective citizen-government interaction. |
| Development of "Smart" Communities | - Applying smart systems to manage municipal services.<br>- Introducing innovative energy-saving technologies and environmental monitoring.<br>- Utilizing IoT solutions to enhance community infrastructure. |
| Enhancement of Digital Literacy of the Population | - Developing training programs to enhance digital literacy, such as "Diya. Digital Education" for individuals aged 50+ and opening 100 digital education centers in communities by 2026.<br>- Promoting the spread of digital technologies among the older generation.<br>- Providing opportunities for retraining workers from traditional sectors to meet the requirements of the digital economy.<br>- Opening digital education centers in local communities. |
| Strengthening Cybersecurity and Personal Data Protection | - Using advanced technologies to protect data in local government authorities.<br>- Creating a cybersecurity strategy for local communities.<br>- Organizing training sessions on the safe use of digital platforms.<br>- Implementing ISO 27001 standards for community data protection. |
| Attracting Investments and International Support | - Implementing grant programs for digital transformation.<br>- Establishing public-private partnerships in the field of digitalization.<br>- Collaborating with international organizations to promote digital development. |

*Source: developed by the author.*

## Conclusions and prospects for further research

Digital transformation occurs gradually through phased implementation and continuous improvement of new technologies. Employees are trained to use digital solutions, and the organizational culture shifts from manual to digital systems. There are many technologies and programs globally that facilitate the smooth transition of municipalities to digital governance. For Ukraine, currently engaged in combat operations, digital technologies have become not only a means of economic development but also a factor of stability, security, and adaptation to new challenges. The use of digital solutions is an effective method for solving urgent problems; it is a requirement of the times and an opportunity for communities to build a robust infrastructure that meets the needs of their residents. By 2027, it is necessary to develop the "Digitalization of Communities" law, create a center for certifying AI systems in communities under the Ministry of Digital Transformation, and launch pilot projects of "smart communities" in 10 regions.

The research results can help territorial communities prioritize organizing a safe electronic environment for each citizen and ensure effective community management.

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