

ORIGINAL

The use of AI in the organization of local government work

El uso de la IA en la organización del trabajo de los gobiernos locales

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ABSTRACT

The article discusses the use of AI in organizing the work of local governments. The competencies required for employees in the management field were identified to enable them to effectively interact with automated systems based on AI algorithms. The most popular types of AI are identified, which are already used in the work of municipalities in Ukraine and abroad. Promising areas for the use of AI in public administration were identified. The results of the current study made it possible to identify a wide practice of using AI in the field of municipal management and describe new opportunities for its implementation in the practice of local self-government bodies in Ukraine. The practical result of the study is a set of recommendations for improving the effectiveness of the use of AI in the organization of the work of local self-government bodies. The theoretical result was the identification of the main regularities in the use of AI algorithms and automated systems created on their basis in the professional activities of specialists in the field of municipal management. It is emphasized that the transition to the use of modern technologies and means of implementing managerial decisions at a qualitatively new level has already become one of the necessary tools for the effective work of local authorities.

Keywords: Artificial Intelligence; Public Administration; Automation; Tools; Algorithms; Municipality; Digitalization.

RESUMEN

El artículo analiza el uso de la IA en la organización del trabajo de las administraciones locales. Se identifican las competencias necesarias para que los empleados del ámbito de la gestión puedan interactuar eficazmente con sistemas automatizados basados en algoritmos de IA. Se identifican los tipos de IA más populares, que ya se utilizan en el trabajo de los municipios en Ucrania y en el extranjero. Se identificaron áreas prometedoras para el uso de la IA en la administración pública. Los resultados del presente estudio han permitido identificar una amplia práctica de uso de la IA en el ámbito de la gestión municipal y describir nuevas oportunidades para su aplicación en la práctica de los órganos de autogobierno local en Ucrania. El resultado práctico del estudio es un conjunto de recomendaciones para mejorar la eficacia del uso de la IA en la organización del trabajo de los órganos de autogobierno local. El resultado teórico fue la identificación de las principales regularidades en el uso de algoritmos de IA y sistemas automatizados creados sobre su base en las actividades profesionales de los especialistas en el ámbito de la gestión municipal. Se subraya que la transición al uso de tecnologías modernas y medios de implementación de decisiones de gestión a un nivel cualitativamente nuevo ya se ha convertido en una de las herramientas necesarias para el trabajo eficaz de las autoridades locales.

Palabras clave: Inteligencia Artificial; Administración Pública; Automatización; Herramientas; Algoritmos; Municipio; Digitalización.

INTRODUCTION

The work of specialists in the field of management is extremely difficult, since it requires essential knowledge, professional skills and a high level of training in the field of information technology. Representatives of local governments often work under extraordinary stresses that a person is simply unable to overcome on their own, without the involvement of additional tools. Currently, digital transformation tools are actively used to solve the problems of automatization of management processes in the municipalities of Ukraine. Digital transformation means the transition from traditional management methods to the use of innovative ones: the introduction of electronic systems and platforms based on the Internet and AI. All these tools are permanently involved in improving the quality of governance, ensuring openness and transparency in the interaction between the authorities and the community (Zabolotenko & Gerasimyuk, 2024).

According to the “State Strategy of Regional Development for 2021-2027”, the organization of the work of local self-government bodies is based on the concept of public administration, which is the key to effectively meeting the needs of community members (On Approval of the State Strategy..., 2024). Digitalization of public administration is one of the central areas where process automation is growing.

A promising method of digitalization and automation is the use of AI algorithms, which involves the use of intelligent machines to perform tasks that traditionally required human intervention (The impact of artificial intelligence in automation..., abs). AI is a revolutionary digital technology that can be successfully used to ensure the sustainable development of communities in the context of governance and local self-government (Matsyuk, 2024). Representatives of domestic municipalities themselves understand the importance of AI for their activities. As stated on the website of the “Association of Small Cities of Ukraine”: “Artificial intelligence is a technology of the future, which today can significantly improve the work of local self-government bodies” (Artificial intelligence as an assistant to the media department..., 2024).

Also, representatives of non-governmental initiatives and members of municipalities of EU member states play an important role in providing domestic managers with tools based on AI. One example of such an exchange of experience is the scientific and practical conference with international participation “AI as a tool for professionalizing the public service”, where all participants were able to gain the necessary knowledge in the context of the tasks and challenges of using AI, the prospects for applying AI-based technologies, talent management and respect for human rights (Scientific and Practical Conference..., 2024).

The research made recommendations for enhancing the effectiveness of AI in local government organization by exposing the primary usage patterns of AI algorithms and automated systems developed on their foundation in the professional activities of experts in the field of municipal administration. The most important problems and risks of using AI in public administration were also mentioned.

Among the main gaps in the considered previous studies on the use of AI in the organization of the work of local self-government bodies, it is necessary to single out the following: the lack of mention of national legislation on AI, the lack of recommendations for improving the effectiveness of the use of AI in the organization of the work of municipalities, ignoring the importance of the technical competence of specialists as an integral part of the work of the manager.

In the context of the subject being studied, this research paper is able to close all the gaps that have been found, attracting readers in the future. The main drawback of the work is the gaps that were made due to the lack of information on the success of the use of AI in the organization of the work of specific local self-government bodies.

Further research on the identified topic should contain examples of a direct correlation between the success of municipal employees and their use of automated systems based on AI algorithms. This will allow to build a mathematical model of the dependence of the effectiveness of the work of local self-government bodies on the use of AI by them, which will make it possible to determine the optimal value of saturation of municipalities with “high technologies”.

Literature review

Every few years there are revolutionary discoveries in various spheres of human life. This is especially evident in topics involving interdisciplinary research. The issues of using AI in the organization of the work of local self-government bodies and its derivatives require knowledge of the basics of information technology, cybernetics and management. Although in the Stalinist era, domestic cybernetics was recognized as bourgeois pseudoscience and was persecuted, but later it was able to revive under the leadership of Glushkov (2023).

The most up-to-date research of both Ukrainian and foreign scientists in the context of the use of AI in the organization of the work of local self-government bodies will be considered.

The use of AI algorithms in city or municipal governance carries certain risks. The main risk is that AI can be used not to solve specific problems or improve processes, but as an end in itself, i.e., the introduction of AI becomes an end in itself without any specific benefit to the efficiency of management (Kvitka et al., 2021). Foreign experience has shown that the achievement of the required performance indicators in many areas of management already depends on the use of AI technologies (Magylias et al., 2023).

The study by Borodin et al. (2021) aimed to identify the main problems and benefits of the digitalization of local self-government and the introduction of digital technologies in municipal management. The articles of Tyurya (2019; 2022) are devoted to the development of proposals for the creation of a regulatory framework for the administrative

and legal regulation of the creation, implementation and use of AI in Ukraine based on the experience of the European Union.

Asiryani (2023) analyzes Singapore's legislation on the use of AI in many areas, including local government. The author suggests that Ukraine develop AI using its experience and best practices.

In the scientific work of Ilyina (2024), it was found that the experience of Singapore, Canada and Estonia on the introduction of AI is an example for adapting best practices to the system of public authorities of Ukraine.

The study of an international group of scientists substantiated the need to balance the costs, benefits, risks and consequences of developing, implementing, deploying and managing local government AI systems in order to achieve sustainable innovation (Yigitcanlar et al., 2021).

Vogl et al. (2020) considered the activities of local authorities in the paradigm of providing them with computational algorithms according to the following principles:

- When implementing new computational algorithms, practitioners should identify the relevant social groups that will be affected, understand the contextual implications from their perspective, and make the most of internal capacity to address local needs and challenges.
- Professionals who use AI in the provision of local government services try to cope with complexity not by simplifying problems in established procedures, but through adaptive predictive algorithmic models that can learn from new inputs and changing conditions.

The work of researchers Sanchez et al. (2023) provides an overview of the issue of interaction between AI and municipalities for urban planning. According to a US poll, planners' organizations are not very knowledgeable about AI algorithms.

The article by Young et al. (2019) aims to consider the impact of AI on decision making by managers, depending on the specifics of their tasks and the complexity of the environment.

Bullock (2019) highlighted the increasing use of AI in governance and society and explored the link between AI, discretion, and bureaucracy.

Medaglia et al. (2023) identified initiatives of a number of governments in the direction of ensuring their activities through the introduction of AI algorithms in public administration.

Taking into account the results of the studies of domestic and foreign scientists, it should be noted that they require updating due to the real revolution in AI technologies and providing additional recommendations for improving the effectiveness of the use of AI in the organization of the work of local self-government bodies.

The purpose of the study is to review the use of AI in the organization of the work of local self-government bodies and determine their value for the work of managers and provide their own recommendations for improving the effectiveness of the use of AI algorithms in the activities of municipalities.

METHOD

In the course of the study, the following scientific literature was used: monographs, review and analytical publications of domestic and foreign researchers, the results of independent observations and open sources from the Internet.

The following general scientific methods were used to solve the tasks set in the course of the study:

- Monitoring method: it was used to collect, systematize and subsequently analyze information on the features of municipalities' activities.
- Comparison method: helped in the study of the roles of AI algorithms and their comparison.
- Method of abstraction: came in handy in order to highlight the main concepts and categories.
- Methods of analysis and synthesis: used in the process of identifying the main stages and factors of development and the most important elements of the research object.
- Inductive method: used to predict the effectiveness of the use of AI by representatives of local governments.
- Abstract-logical and dialectical methods of scientific cognition, as well as the method of scientific abstraction: were used in the study to formulate theoretical generalizations, clarify the conceptual apparatus, and formulate conclusions.
- The method of concretization was used to fix the expediency of the proposed means to increase the effectiveness of the application of AI algorithms in the activities of municipalities.

Information gathering, processing, analysis, and justification methods were used to address specific problems.

The main objectives of the current study are as follows:

1. To explain the features of the activities of local self-government bodies in the context of martial law management.
2. To identify the core competencies (skills) for employees in the field of management.
3. To study the basics of working with AI algorithms.
4. To determine the effects of incorporating AI into municipal operations.
5. To provide additional recommendations for improving the effectiveness of the use of AI algorithms in the organization of the work of local self-government bodies.

The fundamental nature of the study was determined by two main features:

- The results of this research can become the basis for new fundamental research or practical developments.
- The study has a broad theoretical basis and is in-depth.

The relevance of the topic of this study is explained by the importance of the issue of using AI in the activities of municipalities, since due to the full-scale invasion of the troops of the Russia in Ukraine, the digitalization process has critically slowed down, which requires the involvement of representatives of local authorities in its regulation at the community level. Attracting additional resources and managers will help accelerate Ukraine's digital transformation by making management cheaper. The object of the selected study is the process of reviewing the use of AI in the activities of local self-government bodies. The subject is the principles of application of AI algorithms in the work of municipalities.

RESULTS

It is necessary to determine the features of self-government in Ukraine. Local self-government is the authority granted by the state to a territorial community to decide on matters of local importance within the limits of the Constitution and laws, either on its own initiative or through the oversight of local self-government bodies and officials. This authority is used by territorial communities of villages, towns, and cities directly, through village, town, and city councils and their executive bodies, as well as through district and regional councils that represent the common interests of territorial communities of villages, towns, and cities (On Local Self-Government..., 2024).

Although local governments do not belong to the mechanism of state power, they provide various functions that are important for the community (figure 1).

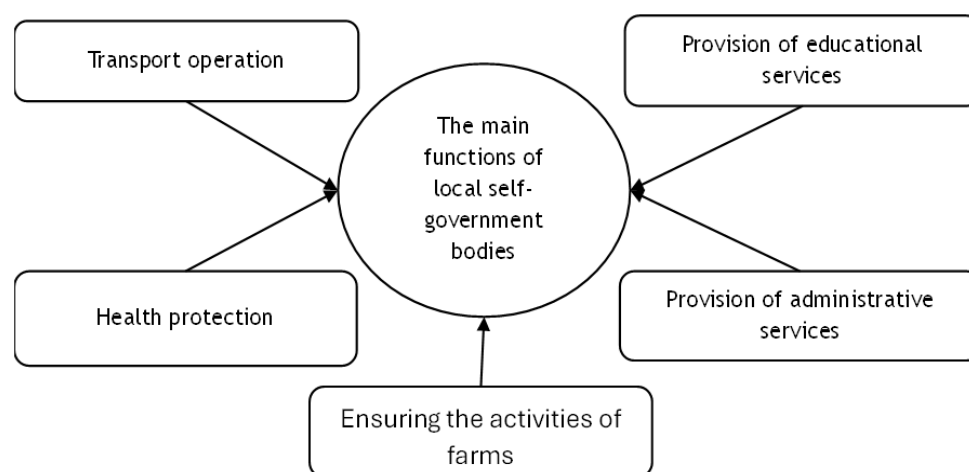


Figure 1. Functions of local self-government bodies

In the context of the war, local self-government bodies began to carry out the functions of protecting the population and defense. This is based on the interaction of local self-government bodies and military administrations. In accordance with the Law of Ukraine "On Legal Regime of Martial Law", local self-government bodies continue to exercise the powers granted to them by the Constitution and other laws of Ukraine (On the Legal Regime..., 2024).

After the introduction of martial law, there were statements about restrictions on the activities of local authorities and their dissolution. The motivation for this decision was wartime, inefficiency and incapacity of the current system of local self-government. However, the beginning of a full-scale invasion showed the effectiveness of local authorities in preserving the life and health of community residents, which led to the expansion of their functions, instead of dissolution.

In conditions of war, Ukrainian representatives of local self-government are supported by the communities of partner countries. One of the projects that helps domestic municipalities is the International Marathon "Uniting the World's Local Governments for Human Welfare and Peace", which exchanged experience and found solutions to current problems. To support the functioning of Ukrainian cities, the Council of Europe initiated the creation of an online platform Cities4Cities, which collects needs and proposals from local governments and helps to establish cooperation to meet them (Mykolyuk, 2022).

The war stopped the process of decentralization, which, in turn, reduces the effectiveness of domestic local self-government. This caused a legal conflict when the scope of powers delegated by executive bodies to local self-government was not regulated by law (Fedina et al., 2023).

The next step of the study is to analyze the main competencies for the effective work of local self-government officials. To do this, they need to have specific skills, including both professional (hard) and social-communicative (software).

Socio-communicative skills are important, and they cannot be taught in an educational institution, because they are acquired only through their own experience:

- Difficult work situations allow to master constructive communication.
- Several meetings teach how to listen.
- A large number of dialogues on understanding in different types of work improves the ability to negotiate (Soft Skills You..., 2019).

It is also necessary to mention the generally recognized social and communication skills, which can be considered a generalized option for any public figure. The division of different soft skills by groups is shown in table 1.

Table 1. Division of social and communication skills into groups

No.	Instrumental skills	Personal skills	System skills	Generally recognized skills
1	Ability to analyze and synthesize	Team work	Autonomous learning	Management and self-development
2	Ability to organize and plan	Interdisciplinary teamwork	Adaptation to new situations	Cooperating and interacting with others
3	Oral and written communication	Work in an international context	Creativity	Communication
4	Knowledge of foreign languages	Intrapersonal skills	Leadership	Task management and problem solving
5	Computer skills	Interpersonal skills	Knowledge of other cultures	Application of mathematics
6	Ability to manage information	Recognition of multicultural diversity	Entrepreneurial spirit	Technology application
7	Problem-solving	Critical thinking	Motivation for quality	Applying design and creativity
8	Decision making	Ethics	Environmental sensitivity	-

Source: based on (Clark, 2023; Marin-Zapata et al., 2022)

Based on the data of table 1, several conclusions can be drawn about the social and communication skills of a local government official:

- Since there are many of these skills, no one person is able to master them all.
- For different functions, it is necessary to have different sets of skills, since their relevance for different situations is completely different.
- Some skills can be interchangeable, such as interpersonal skills as well as oral and written communication.

Since social and communication skills are related to teamwork, in order to determine the necessary competencies of a local government official, it is necessary to consider a person as a member of the community who works to preserve and develop it. The activities of a local government representative are expressed in the following actions:

- Managing communal property.
- Approving programs of social, economic and cultural development.
- Approving the local budget.
- Establishing local taxes and fees.
- Conducting local referendums.
- Creating and liquidating municipal enterprises and organizations.

Thus, the effective actions of a representative of local self-government bodies require him to be competent in law, economics, fiscal policy and culture. As with sociocommunicative skills, it becomes obvious that one person cannot possess all these competencies at once. That is why local self-government bodies have a collective form and are electoral, which allows electing representatives with different skills and competencies.

To study the basics of working with AI algorithms, it is necessary to define the concept of “artificial intelligence”. AI is the intelligence demonstrated by machines, including computer systems. This area of computer science study focuses on creating and analyzing tools and software that enable machines to detect the environment and use intelligence and learning to take actions that will increase the chance that they can achieve certain goals (Russell & Norvig, 2021).

The work with AI algorithms depends on many indicators, the main one being its type, and five of them are important in the context of local self-government (figure 2).

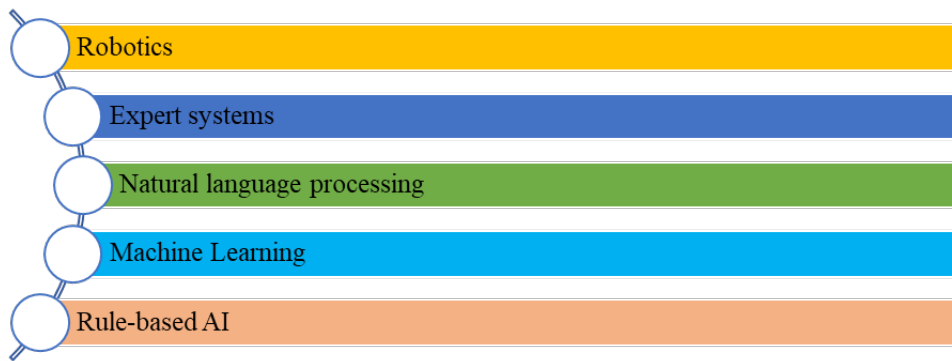


Figure 2. Types of AI

Shown in figure 2 connections of AI types explain that it can work on the basis of only one type, but it is also possible to combine them (strong AI). Although it is still a theoretical concept due to a number of technical problems in the implementation of such a combination. It is also necessary to explain the features of all types of AI that can be used in the activities of local self-government:

1. Rule-based AI: programmed with a set of rules or operators that allow decisions to be made based on specific conditions. It is used in expert and decision support systems.
2. Machine learning: involves learning algorithms based on input data and improving their performance over time. There are three main types of such learning (guided learning, unguided learning, and reinforcement learning).
3. Natural Language Processing (NLP): focuses on the interaction between a computer and human language. This type is designed to understand and interpret human language, and is used in chatbots, voice assistants, and machine translation.
4. Robotics: the design and development of robots that can perform on the physical world. This type involves the integration of AI, sensors and mechanical systems so that robots can perceive the environment, make decisions and perform actions.
5. Expert systems: designed to provide advice and support decision-making in various fields. They are programmed with a set of rules and knowledge that allow to reason and make recommendations based on specific conditions.

All of these types of AI can be involved in the work of municipalities, depending on the tasks assigned. They have already shown in the following directions:

- The preparation of content for articles, presentations, publications.
- The correspondence with colleagues and community members.
- The formation of applications, tables, checklists.
- The planning and strategy development.
- The search for modern ideas and offer of their implementation mechanisms.

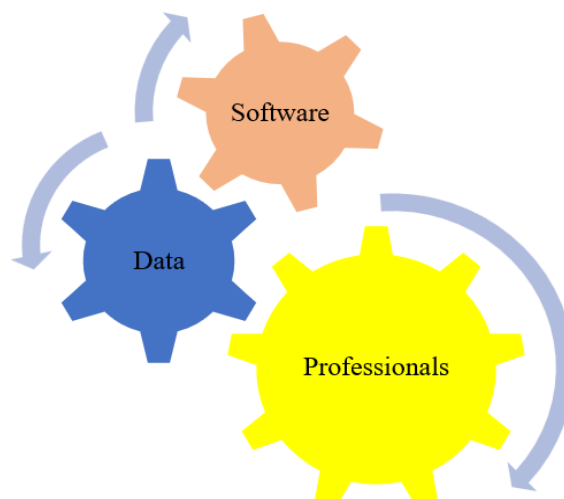


Figure 3. Resources needed to develop AI-based systems

If a whole department of specialists was previously required to perform all these functions, now they can be performed by several applications based on AI algorithms (ChatGPT, Bard, Claude.ai, Llama 2). Municipalities, subject to the availability of resources, can independently develop tools that use elements of AI.

The resources required for this are shown in figure 3.

However, the development of own tools that use AI elements requires monetary investments and considerable time. Therefore, the best way for local self-government bodies is to use ready-made solutions.

It is necessary to determine the consequences of the introduction of AI in the activities of local governments. Unfortunately, they can be not only positive, but also create additional threats to the well-being of community residents:

- Losing jobs due to their replacement with automated AI-based systems.
- Decreasing in the quality of services provided by representatives of the municipality.
- Reducing the number of available services for those residents who do not have access to the network or electronic gadgets.
- The problem of maintaining data confidentiality to protect it from the actions of intruders and fraudsters.

The primary benefit of integrating AI into a municipality's operations is a change in focus from quantitative indicators (i.e., identified violations and individuals or groups prosecuted) to preventive work. This reduces corruption and minimizes violations by more precisely monitoring the conditions that encourage their occurrence in local government operations.

To successfully integrate AI into the activities of local self-government bodies, it is necessary to organize the following conditions:

- Clarity and simplicity of working with the proposed systems for all members of the community.
- Creating a clear preliminary plan for AI integration and further adherence to its main stages.
- Warning local residents about the use of AI to comply with high ethical standards.
- Providing alternative forms of service delivery if they are not available in digital form.
- Making presentations on the benefits of using AI.
- Cooperation with educational institutions to provide the municipality with high-class specialists in the field of information technology.

Working with AI-based systems may be learned and developed through a variety of means, such as attending training sessions and classes, studying specialized books and videos, and enrolling in higher education institutions with information technology departments. The abilities necessary for any local government official to work with AI might vary greatly depending on their role, since it is based on the field in which they operate.

DISCUSSION

Although the topic of the use of AI in the organization of the work of local self-government bodies has gained wide popularity among domestic and foreign researchers, none of the sources considered has been disclosed in such a volume and in such a complete form. Also, no recommendations were found to increase the effectiveness of the use of AI in the activities of municipalities.

During the discussion, it was decided to conduct a content analysis, for which a component composition (words or phrases) was created, which is given in table 2.

No.	Component	Links to creators
1	Municipality (K1)	(Kvitka et al., 2021; Sanchez et al., 2023; Mykolyuk, 2022)
2	Control (K2)	(Zabolotenko & Gerasimyuk, 2024; Matseruk, 2024; Bullock, 2019)
3	Digital Transformation (K3)	(Borodin et al., 2021; Russell & Norvig, 2021)
4	Bureaucracy (K4)	(Vogl et al., 2020;)

As can be seen from table 2, the component composition of the concept of “work of local self-government bodies” is variable and differs significantly in internal content. Consequently, a single approach to determining the essence of the concept under study has not been formed among scientific approaches. The author highlighted those components of the concept of “work of local self-government bodies”, which are often found in the works of domestic and foreign scientists.

The next stages of content analysis involve identifying the number of mentions and counting them for each component.

Depending on the number of mentions of the previously identified components in the analyzed sample, each of them was assigned corresponding ranks, as shown in table 3, table 4, table 5, table 6.

Table 3. Correlation between the number of mentions and the rank of the components of the concept “municipality”

No.	Component rank	Number of mentions
1	(K1)	2
2	(K2)	1
3	(K3)	2
4	(K4)	1
Total number of mentions: 6		

Table 5. Correlation between the number of mentions and the rank of the components of the concept of «digital transformation»

No.	Component rank	Number of mentions
1	(K1)	1
2	(K2)	2
3	(K3)	3
4	(K4)	1
Total number of mentions: 7		

Table 6. Correlation between the number of mentions and the rank of components of the concept “bureaucracy”

No.	Component rank	Number of mentions
1	(K1)	1
2	(K2)	0
3	(K3)	0
4	(K4)	2
Total number of mentions: 3		

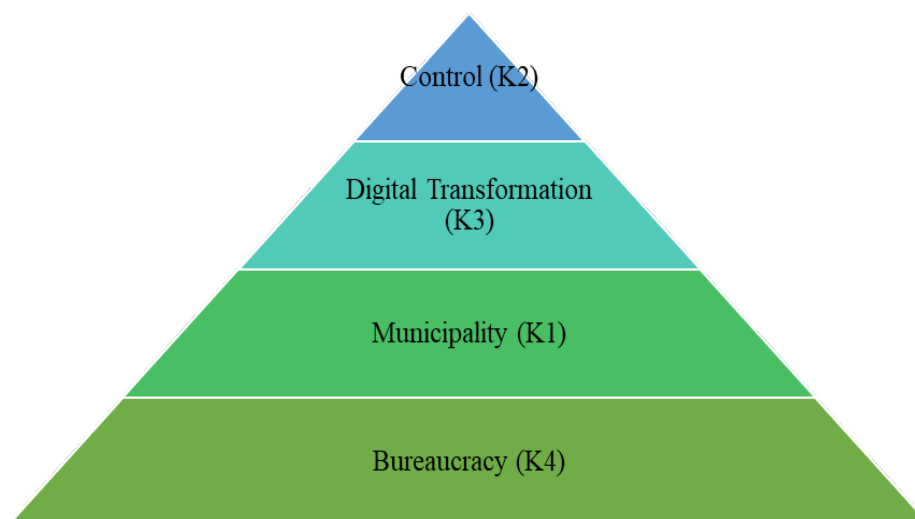


Figure 4. Component composition of the concept of “work of local self-government bodies”

Taking into account the data in table 3, table 4, table 5, table 6, the main components were selected (by frequency of mention) and the component composition of the concept under study was determined (figure 5), which is the last stage of content analysis - interpretation of the results regarding the main goal (definition of the concept).

Based on the study, the following recommendations can be made to improve the effectiveness of the use of AI in the organization of the work of local self-government bodies:

- It is necessary to determine the functions of a specific specialist in the municipality.
- To conduct a study of potential threats and risks to these community members.
- To make preliminary calculations necessary for planning the integration of AI.
- To explore the features of the team: communication and special skills of employees.
- To consider the feasibility of using AI initially for simple, repetitive tasks.
- To attract competent specialists: information technology mentors.
- To pay for employees' access to specialized literature and courses.
- To adapt the automated system based on the AI algorithm to its own tasks gradually.

In the absence of the necessary financial resources to modernize the automated system or create their own, local government employees can turn to state institutions or independent groups of information technology specialists. This will allow them to form a query about their specific technical needs in the context of providing tools based on AI algorithms. The recommendations provided will help municipal employees and community members understand the importance of their readiness to deepen the digital transformation process, which will play a positive role in the development of information technologies and local self-government bodies of Ukraine.

CONCLUSIONS

Thus, the study considers the use of AI in the organization of the work of local self-government bodies and determines the value of AI for the work of municipal employees.

Generally recognized social and communication skills and competencies are mentioned, which are also important in the work of local self-government officials. The most popular types of AI that are already used in the work of municipalities in Ukraine and abroad are highlighted, namely: rule-based AI, machine learning, NLP, robotics, expert systems.

The functions of local self-government bodies by features of their activities under the martial law regime were revealed, which showed the importance of the work of municipalities in war conditions and the large amount of their potential tasks.

It is determined that the set of skills necessary for employees of local self-government bodies can change quickly and dramatically, since it is determined by the position of the specialist and the field of his function. A number of additional recommendations are provided to increase the effectiveness of the use of AI in the organization of the work of local self-government bodies, through the prism of the author's vision of the concept of "artificial intelligence" and management.

The following studies of the identified topic should contain examples of a direct correlation between the success of municipal employees and their use of automated systems based on AI algorithms, which will allow to build a mathematical model of the dependence of the efficiency of local self-government bodies on their use of AI and will provide a unique opportunity to determine the optimal value of saturation of municipalities with "high" technologies.

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Conceptualization: Herasym Dei.

Formal analysis: Herasym Dei.

Research: Herasym Dei.

Methodology: Herasym Dei.

Drafting - original draft: Herasym Dei.

Writing - proofreading and editing: Herasym Dei.